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[OFFICIAL NOTICE.]

Fifth Annual Meeting, Iowa District Gas Association.

OFFICE OF THE SECRETARY AND TREASURER,
DES MOINES, IA., May 20, 1909.

ANNOUNCEMENT.

The fifth annual meeting of the Iowa District Gas Association will be held in Waterloo, Ia., June 23, 24 and 25, 1909. The following papers will be read:

"Construction and Operation of a Gas Works in a Town of Five Thousand Inhabitants or Less;" by Mr. Thos. Crawford, Clinton, Ia.

"The Gas Meter: Its Construction, Operation, Sources and Causes of Error, and Its Reliability as a Measuring Device;" by Mr. R. H. Lawlor, Waterloo, Ia.

"The Operation of the Modern Carburetted Water Gas Machine;" by Mr. Wm. J. Bertke, Sioux City, Ia.

"Mutual Interests of the Gas Company and the Community;" by Mr. George McLean, Dubuque, Ia.

"Organizing and Pursuing New Business Campaigns;" by Mr. E. H. Martin, Des Moines, Ia.

"High Candle Power Competition;" by Mr. Elmer Crady, Sioux City, Ia.

Three topics will be discussed in addition to the papers:

"Keeping Ice Out of Steel Holder Tanks and Cups."

"Methods of Disposal of Waste Water from a Gas Works."

"Progress of Tar Market During the Year."

Two special features will form a part of the programme:

1. *An Exhibit of Appliances.*—Suitable space has been leased by the Waterloo Gas Company and is offered free to manufacturers. For details, communicate with Mr. R. H. Lawlor, Chairman, Waterloo, Ia.

2. *An Open Session.*—For free discussion, without a stenographer, will be held the evening of June 23d.

G. I. VINCENT, Sec'y and Treas.

[OFFICIAL NOTICE.]

Second Annual Meeting, Canadian Gas Association.

OFFICE OF SECRETARY-TREASURER,
WOODSTOCK, ONT., May 11th, 1909.

The second annual meeting of the Canadian Gas Association will be held in Montreal, Canada, Friday and Saturday, June 18th and 19th, 1909.

Papers of a most interesting and instructive nature are being prepared and the announcement of their titles will be made later.

Arrangements are in the hands of an entertainment committee for the entertainment of delegates, outside of business meetings.

Montreal is Canada's largest city, beautifully situated, and affords great opportunities for entertainment. There are several large, first-class hotels, but reservations should be made early. The business meetings will be held in the Windsor Hotel. Yours very truly,

A. W. MOORE, Secretary-Treasurer.

[NOTICE.]

Wrinkle Department, American Gas Institute.

WRINKLE DEPARTMENT, AMERICAN GAS INSTITUTE,
OFFICE OF EDITOR, GAS OFFICE BUILDING,
DETROIT MICH, March 12th, 1909.

To the Members, American Gas Institute: All members of the American Gas Institute are earnestly requested to forward contributions for the Wrinkle Department as soon as possible.

Your co-operation determines the success of the Department.

F. L. CROSS, Editor.

LIBRARY OF CONGRESS JUN 7 1909 SMITHSONIAN DEPOSIT

OUR HALF-CENTURY SPECIAL NUMBER.

Next month we complete our Fiftieth Year. To commemorate it fittingly the proprietors have determined to print a special issue, on the pages of which will be given a fair history, and at some length, of the progress made in the gas industry since the JOURNAL first appeared to champion the cause. The issue is to have 100 pages, with special cover, the size of the pages to be even with those in the regular edition. One-half the issue (50 pages) will be given to the publication of articles (14 in number) on the leading phases of gas manufacture and distribution, the sketching of the articles to be historical. These articles are in course of preparation by men whose eminence in the profession cannot be gainsaid, and each of them is addressing himself to a subject regarding which he undoubtedly possesses expert knowledge. The remainder of the issue will be given over to advertising, the rates for which are as follows:

One page $50.
One-half page $25.
One-quarter page $13.

The cover pages, inside and out, have been engaged (these were let at figures approximately 200 per cent. higher than the "inside") and 46 of the interior pages have also been contracted for. The edition will go free to everyone of our regular subscribers and advertisers, and extra copies will be furnished at the rate of 50 cents each. No concession in price will be made for orders for extra copies to anyone. Those who desire to advertise, and those who wish to secure extra copies, should address the publishers at once. No undue claim to excellence is made when it is stated that this special issue will contain more in value to the fraternity than was contained in any other issue of any gas news periodical ever printed.

BRIEFLY TOLD.

OBITUARY NOTE, MR. FREDERICK J. DAVIS.—Those who attended the last meeting of the New England Association of Gas Engineers marked with sorrow that "Fred." Davis, as he was familiarly known to every gas engineer in New England, was far from being the "Fred." of even a year or so before. A severe attack of bronchitis, in the fall of 1908, had left its mark upon his activities, and although some approach to his old self was manifested at the commencement of the year, a slight relapse undid all of Nature's effort at repairing, and since March last this decline was rapid. Nor is that to be wondered at, for he had lived far beyond the allotted three score and ten. Early last month it was decided that he would have to undergo an operation, and having been trained, as far as such process could go, for the surgeon's hands, he was conveyed to the Riverback Hospital, Cambridge, Mass., and in time underwent the operation. For a brief space it seemed as if the grit which had pulled him through many a dangerous happening would again serve him in good stead; but this time Nature would not be denied, and the end came to him quite as release comes to a prisoner, rather in hopeful anticipation than in dread. Frederick J. Davis was born in Plymouth, Mass., April 21, 1832, and in his early youth was apprenticed as a moulder to a foundry in Boston. He subsequently became one of the most noted workmen in that line in and about that city. His physicality was really of the order wonderful, and in after years he often detailed in modest way, usually after urging, many feats that to thoroughly acquiesce in was somewhat of a tax on the credulity of the one who was listening to such a story or stories for the first time. Of a verity, there seldom comes to a man such changes in a lifetime as those that came to Mr. Davis. In 20 years' time the burly, mayhap at times boisterous, moulder had become a complete man of the world. Well built, well mannered, well dressed at all times, the ironmaster of 1880 was the very antithesis of the iron moulder of 1860. Brainy, quick, untiring, Mr. Davis worked his way from the floor of the foundry to the office, and from the office to the road as selling agent, and the writer makes no mistake in saying that in his time no travelling man presented a better appearance, nor one who produced better results for his house. In due time (we think towards the later sixties) he formed a business relation which resulted in the formation eventually of the well-known house of the Davis & Farnum Manufacturing Company, of Waltham, Mass., the good fame of which in the gas construction circles of the United States needs no mention at our hands. Specimens of their workmanship may be seen in every eastern city, and in the South and West as well. He was noted for his activities in connection with Gas Association work, having been one of the earliest members of the New England Association of Gas Engineers and was also on the rolls of the American Gas Light Association, and of the Guild of Gas Managers. The latter body was held in great esteem by him and no other of its members was surer of a warmer welcome to its sessions. He was the close associate and near friend and companion of men of the stamp of the famous Greenoughs and Slaters, both the father and sons, of the Nortons—but in this mentioning the writer must stop, lest he be obliged to call the complete roster of New England's best known men for the past 50 years. Perhaps no undue claim regarding his personality, and the way in which he was held by his associates would be best put in the expression that as the late Captain W. H. White was to the fraternity at large so was Mr. Davis to the fraternity of the East. Big, handsome and active, Mr. Davis will be remembered fraternally by all who knew him, while their time is earthly. Deceased was one of the most prominent of New England's Masons, having attained the 32d Degree, and was a charter member of De Molay Commandery, Isaac Parker Lodge, of Waltham, Mass. The funeral services were held Saturday, May 29th, in the Cambridge First Universalist Church, the Reverend Mr. Becknoll officiating. The services were largely attended by the gas men of the East, the Guild of Gas Managers and the New England Association of Gas Engineers being officially represented. Interment was subsequently made in Mount Feake Cemetery, Waltham. His immediate survivors are one son and two daughters. For courtesies in connection with this history we are indebted to the attention of Mr. Charles F. Prichard and Mr. George W. Eccles.

REMEMBERING THEIR CHIEF.—Some time ago we noted briefly the resignation of Mr. Lewis B. Sharp from the position of General Manager of the Queensboro Gas and Electric Light Company, which corporation supplies gas and electric currents to the residents of "All the Rockaways," as well as to many other points in that beauty spot of Long Island which figures on the maps as Queens County. When Mr. Sharp took hold of the affairs of the Bush Electric Light Company, of Far Rockaway, in 1884, he was shortly thereafter also put in control of the gas property formerly operated under the title of the Town of Hempstead Gas Company, through an amalgamation of the named gas and electric interests, which union came about through the good business acumen of Mr. Carleton Macy and associates, of Philadelphia. Mr. Sharp's management of the conbined current supply—albeit he never quite got over the idea that the electric current was a greater money maker than the gas current—was modern and connected, despite the interjection now and then of smart examples of executive ability, and the development of the territory from a residental point of view was simply amazing. However, prosperity attended the operating method, and that was enough. There came a time, however, when Mr. Sharp made safe his mind that other fields of business presented better chance for quicker emolument and so, to make his purpose plainly known to his people, the executive head, having first been duly notified of his intention, he invited all the employees to dine with him the evening of June 1st, the scene of the feasting to be set in the Manhattan Hotel, Far Rockaway. Forty of his officers and men were on hand to listen to their Chief, the only guests being Messrs. William T. and Edward Sullivan, of Flushing, Mr. Watkins W. Jones and Mr. Coulter Avery. Mr Sharp acted as Host and Toastmaster, filling both positions in the cleverest manner possible. The dinner, of course, was all that it could have been, but it was merely a prelude. Mr. Sharp having set forth, in good and affecting speech, the fact of his resignation, and referring handsomely to the staunchness of his superiors and to the faithfulness of his subalterns, was, at the close of his remarks, addressed by President Carleton Macy who, in his suavest way, presented Mr. Sharp with a beautifully engrossed record, noting that the Company accepted his resignation with regret and wishing him every possible advance in his new field of work. And as a fitting finale to the first deeds Mr. Macy handed Mr. Sharp a check, the value of which would make a sensible addition to the bank account of any Long Islander. Poor Mr. Sharp, the end was not yet; for out of the group came another gift bearer. This time it was the rank-and-file who had their fling at their late Director, and their representative bore unto him and placed in his hands a magnificent loving cup of silver, exquisitely ornamented and suitably engraved, so that hereafter, when prettily reposing in the Sharp habitation, its lines will tell the story of how he was loved by his men. The whole proceedings were of a nature that thoroughly showed how the masters and the men may be, each to the other, as towers of strength.—S.

CURRENT MENTION.—

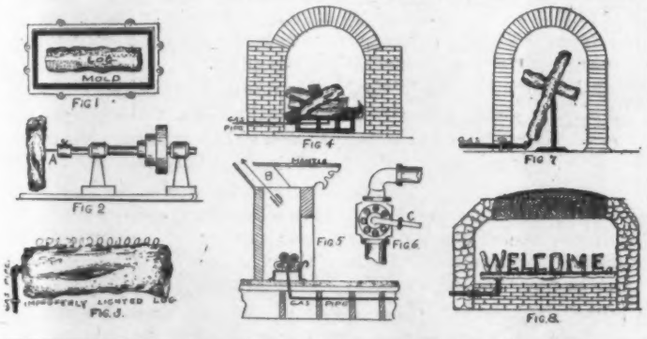
WITH much pleasure we chronicle the fact that the proprietors of the Montreal (Canada) Light, Heat and Power Company have accepted the plans and recommendations submitted by Mr. Howard E. Mann, for the reconstruction of the gas plant division of their properties, and that Mr. Mann has been given complete charge, as engineer of the Company's gas division, of the construction of the new works and its subsequent operation. We congratulate both principals in this happy arrangement, even though it does take from the States a gas engineer of exceeding merit and a thoroughly loyal subaltern. May the best of good luck attend him.

AT a special meeting of the Directors in the Chattanooga (Tenn.) Gas Company Mr. W. S. Chapman was formally installed as Manager of the new business department, and it was decided to go on with main extensions whenever and wherever possible.

Installation of the Gas Log Fireplace.

[Communicated by "R."]

The design, manufacture and installation of the gas log fireplace in residences, offices, hotels, depots, libraries, railway depots, stores, waiting rooms and other places, have opened a new channel for the consumption of gas and to tax the ingenuity of gas engineers. The gas log fire proposition is an old one, for gas log fireplaces have been in use for years; but, like many other inventions which have crept along, barely keeping alive for years, little interest is taken in them until the boom comes and the inventions become paying business propositions. With the introduction of concrete logs, artistically designed fireplaces, improved methods of starting and running a gas log fire, gas as a fuel for fireplaces in modern homes has become a household factor. Your correspondent visited numerous homes for the purpose of interviewing housewives on the subject of gas log fires. I was shown elaborately designed fireplaces, with beautiful fronts and finely installed gas log fixtures. I saw plain fireplaces and fireplaces of all kinds in all sorts of homes with the gas log fireplace. It seemed a pleasure for the dainty housewife to demonstrate how readily she could manage the gas log fire. In the first house the young woman clicked a lever with a steel hand-holder, applied a lighted match and in a moment the large fireplace was brilliantly illuminated with the regularly distributed miniature jets of gas flames shooting from the pores of the serial arrangement of cement logs made, finished and arranged in the order of a wood fire. Almost immediately I felt the delightful warmth in the damp room. In 2 or 3 minutes the room was comfortably heated. The lady clicked the lever back a little and reduced the flame. She said she liked the gas log fireplace because she could start and extinguish the fire so quickly



and easily. No ashes or dust to bother and seldom if ever out of order. She said it was far cheaper than an electrical log fireplace and cheaper than burning wood or coal. And I got the same information from other persons who had used the gas log fireplace.

Next I looked up the process of making the gas log outfits. The gas log is made as nearly like the log you get from your wood pile as possible. Cement, properly mixed with sand and water, is simply cast in a mold, as in Fig. 1. This view shows one side of the mold, the other side is clamped on. In some cases the log is cast with a view of having portions porous to admit the passage of the gas for ignition. As a rule, the gas openings are made with a drill, *A*, Fig. 2. Then, when the log is arranged in position, the series of jets burn in the required proportion about the upper surface of the log. At first logs were improperly drilled, as in Fig. 3, resulting in the production of a fixed line of lights as shown; but this did not give the proper representation of a log fire. The holes are now so distributed and inclined that the flames spread, quiver, lap, shoot and perform other motions exactly as in the burning of real logs.

After the logs are made, the operation of installation begins. The gas engineer who is in charge of putting in the gas log fireplace makes his measurements for the placimg of the logs and pipes in the most suitable way for effecting connections in the building.

The position of the gas main must be determined. If the grate is already in place, the logs are adjusted and the connecting pipes arranged. Sometimes the conditions warrant putting the gas supply pipe through the side of the brick fireplace, as in Fig. 4, in which case considerable chipping and mason work are necessary. Then, again, some housewives do not object to having the gas pipe exposed, providing it is bronzed, thereby avoiding cutting through walls. One pipe I saw ran from the gas fixture of the room along the wall to the fireplace. Then, again, in another place there was no sign of a gas supply pipe, for the reason that the pipe passed beneath the floor and extended up into the fireplace immediately beneath the grate, as in Fig. 5. Fig. 6 shows one of the forms of governing valves used to open the gas flow and control the flow by means of the lever *C*. In one place I observed the sign of a cross, as in Fig. 7, manufactured with the concrete porous gas logs. The effect was very striking. In another home the word "Welcome" was flashed out from the burning embers of the fireplace, constructed entirely with the gas flames from the concrete porous gas logs, as in Fig. 8. I saw numerous other designs worked out.

There is no doubt an increasing field for the use of gas log fires. I understand that advertising men are engaged in working out a scheme of night advertising with concrete porous forms in which gas flames will produce the illumination. More about this will be written after further investigation.

[Proceedings, as Furnished by the Secretary.—Continued from page 972.]

PROCEEDINGS, THIRTY-NINTH ANNUAL MEETING, NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

Held in Young's Hotel, Boston, Mass., Feb. 17, 18, 1909.

Second Day—Morning Session.

Mr. W. C. Ware, Boston, Mass., then read the following paper on

THE COMPARATIVE PRACTICAL EFFICIENCY OF VARIOUS TYPES OF GAS LAMP.

Although there have been numerous and exhaustive researches regarding the practical efficiency of the electric lamps in common use, there has not, to my knowledge, been any similar word to determine the actual rating of the different types of gas lamps, and of the same lamp with different glassware. That is, we have distribution curves worked out, and tables giving comparative consumption and maximum candle power per cubic foot, or mean spherical candle power per cubic foot, etc.; but regarding the practical application of the lamps there is little data. I have, accordingly, worked out some rough calculations along this line which may be of interest. I wish here to express a very lively appreciation of the valuable paper contributed at this year's convention of the Illuminating Engineering Society, by Messrs. Cravath and Lansingh, on "The Measurement of Illumination by the Flux-of-Light Method." This method will be found very useful for the rapid determination of the number of lamps required for a given area and specified illumination. I should explain that the results described below are, at best, very rough, and, since they were reached purely by calculation, not by actual test, there is likely to be some variation from conditions obtained in actual practice.

I have chosen for the problem a rectangular room 50 by 30 feet and 12 feet high. This space is sufficiently large to allow the lamps to be so placed, if desired, that where reflectors are used the main flux-of-light shall be directed entirely at the floor and shall not reach the walls. The plane of illumination is 3 feet above the floor, and the average illumination to be secured is 3 foot candles for the whole area. This intensity is pretty generally agreed upon as being a mean which suits most ordinary purposes. It is the usual upper limit for churches, auditoriums, general merchandise stores, etc., and it is the usual lower limit for bookkeeping, desk work and draughting purposes. There is, therefore, an area of 1,500 square feet, requiring a supply of 3 lumens per square foot, or 4,500 lumens in all—1 lumen being the amount of light required to give an intensity of 1 foot candle over a surface of 1 square foot at a distance of 1 foot.

Applying the flux-of-light method, described by Messrs. Cravath and Lansingh, to determine the number of effective lumens given off by the various burners under consideration, we get the results shown in the following table. I have taken the effective angle of illumination for general lighting of the nature under consideration, as 60° above the vertical. At the usual height of a chandelier of about 7 feet above the floor, or 4 feet above the plane of illumination, light given off at this angle will strike the plane at a distance of about 7 feet. This angle is possibly somewhat low for the consideration of light sources of high candle power, but for the consideration of the lower power lamps, the light given off above 60° would not play a very large part in the direct illumination. It should be noted, however, that in the case of a large room it is not safe to disregard entirely

Room, 50 by 30 feet, 12 feet high, 1,500 feet square; plane, 3 feet from floor; intensity, 3 foot candles; effective angle, 60°.

Type of Burner.	Effec. Lt. below 60° Lumens.	Light above 60° Lumens.	Mean Spherical C. P.	Cons. Cubic Feet.	Case 1.—Dark Room. No. of Lamps.	Total Cu. Ft. Per Hour.	Total Effec. Lumens Per Cu. Ft.	Cu. Ft. Per Ft. Candle Per Sq. Ft.	Case 2.—Light Room. No. of Lamps.	Total Cu. Ft. Per Hour.	Total Effec. Lumens Per Cu. Ft.	Cu. Ft. Per Ft. Candle Per Sq. Ft.
Open flame	65	186	20 c. p.	5.0	69	345	13.0	.0767	40	200	22.2	.0444
Upright lamp—												
Bare mantle	119	672	63	3.7	38	140	32.2	.0311	16	59	77.5	.0131
"Q" globe	137	430	45	5.0	33	165	27.4	.0367	18	90	49.0	.0200
Opal dome and bobesche	212	283	39.4	3.6	21	76	58.9	.0169	16	57	78.6	.0127
Fluted flat reflector	183	528	56	3.7	25	92	49.5	.0204	14	52	85.1	.0116
Inverted lamp—												
Bare lamp	272	507	62	3.22	17	55	84.5	.0122	11	35	123.9	.0078
Ground glass	226	420	51.5	3.0	20	60	75.3	.0133	13	39	110.3	.0087
Holophane distributing reflector	446	200	51.5	3.22	10	32	138.5	.0071	9	29	154.0	.0064
Arcs—												
Four-burner upright gas arc	1,090	1,910	239	19.0	4	76	57.0	.0169	3	57	82.5	.0127
Three-burner inverted gas arc	890	1,838	217	11.0	5	55	81.0	.0122	3.3	36	123.0	.0080

the direct light given off above this angle, as the total amount of such light coming from many lamps at a distance adds materially to the illumination at any given spot. For the more common problem, however, of a room of only moderate proportions, the angle stated is probably sufficiently correct.

It should be further noted that in all unshaded lamps, except the inverted mantle burner, the maximum intensity of light is given off at about the horizontal. Where the walls of a room are dark, so that reflection from them is missing, it is, therefore, necessary to utilize these powerful rays by means of suitable shades, to as great an extent as may be possible.

In the table there are given two cases, one showing the number of lamps required for the given room where both ceiling and walls are dark so that only the direct illumination is utilized. This condition, with absolutely no reflection, is, of course, almost purely theoretical, and is seldom met in actual practice. Under the second the lamps, etc., required for the same illumination in a room with light ceiling and walls are given.

As regards the various lamps studied, the open flame burner gives an illumination singularly uniform in every direction, the only point where the intensity falls off materially being in the zone of 5° or 10° directly under the burner. In all other directions the light given off is almost uniform. The adoption of this burner for the dark room in Case 1 would insure a moderately even illumination, provided outlets were arranged in sufficient number, preferably not more than 5 lights to a fixture. It will be seen that the cost of installation will be high in this case, and the operating cost very high, 69 burners being required.

The bare mantle has a well-defined shadow beneath it and is objectionable on this account, but more particularly by reason of its great brilliancy, and should, of course, never be employed unshaded. Unfortunately, it is only too common to see crude, unshaded installations on every street. The number of burners here is only about ⅓ the number of open flame burners required, this somewhat unfavorable showing being due to the small proportion of light given off below 60°.

An installation of mantle burners equipped with the "Q" globe requires 33 lamps, the total light given off below 60° being somewhat more than that given by the bare mantle, while the distribution is better, there being no dense shadow beneath the lamp. It is interesting to note that the total absorption of this form of shade is about 47 per cent. for equal gas consumption. In spite, however, of the loss in efficiency, a burner equipped with this shade is in general far preferable to the open mantle burner, owing to the great decrease in the intrinsic brilliancy of the lamp.

The prismatic Class "B" shade for the upright mantle burner gives much the same distribution below the horizontal as the "Q" globe, but the absorption is considerably less. The shade is, moreover, more artistic, and is for that reason also preferable. For general illuminating work this is probably the most satisfactory of the upright mantle globes and is worthy of more extended adoption.

The next lamp used is the upright mantle, equipped with opal dome and bobesche. This lamp gives a powerful light throughout an angle of about 30° from the vertical, and even if hung high is sure to give a spotty illumination. I have included it in the list, however, as it is a very common type and is still widely used for general illumination where some other form of shade might better be employed. For such general purposes the distribution would be aided by the omission of the bobesche. I have not, unfortunately, been able to secure curves showing the distribution without the bobesche. Twenty-one lamps with this equipment will be required to give the total 4,500 lumens required, but to secure an illumination reasonably even more lamps would be necessary. It is noteworthy that the absorption of light by this equipment amounts to about 36 per cent.

The last lamp of the upright mantle pattern to be considered is that equipped with the common flat, fluted, opal glass reflector. This gives a fairly good distribution, the chief objection being that the mantle is left exposed to view. The number of lamps of this pattern required to secure fairly even illumination is 25. It is unfortunate that no effective study of prismatic glassware has been made with a view to providing prismatic reflectors of the pagoda or inverted bowl type, similar in general to the bowl reflectors for electric lamps. A reflector of this type could be made to give a very satisfactory distribution curve for the upright mantle burner at very much greater efficiency than is done by any of the reflectors for this type of burner now in use. Inasmuch as the upright burner will for many years have a very distinct field, it would seem that some investigations might profitably be made along this line by the manufacturers.

Turning to the inverted gas burner, which has during the past year been proved so thoroughly reliable and efficient, we find that only 17 of the unshaded lamps are required to give the 4,500 lumens specified. It should be noted here, however, that the inverted lamp should, in general, be hung somewhat higher than has been the custom with the ordinary burners previously in use. The height of about 8 feet will give very satisfactory and uniform results. The bare mantle, however, even if hung high, is open to the objection common to all incandescent lamps, that the high intrinsic brilliancy is distinctly uncomfortable; although, owing to the larger surface involved, this objection is not so strong as in the case of the electric incandescent lamp.

The inverted gas burner, equipped with ground glass globe, shows an absorption of about 17 per cent. The distribution is not quite so good as in the case of the bare lamp, there being a small zone of high candle power at the nadir. Twenty of these lamps would be required, and although the illumination produced would be somewhat more spotty than in the case of the bare mantle, the general effect of the room would be preferable, owing to the diffusion of light at the lamp. Beyond any question, however, the most satisfactory lamp of any on the table is the inverted mantle equipped with prismatic distributing reflector. Absorption here is about the same as that of the ground glass globe. The distribution, however, is vastly superior and only 10 lamps are required, producing the specified 4,500 lumens. It would, however, be inadvisable to hang these lamps at the usual height of 7 feet, better results being obtained at the height of about 8 feet 6 inches. The figures referred to so far were calculated for a room with dark walls and ceilings. Such conditions are, however, extremely rare, and account should be taken of the reflection from ceiling and walls. If the amount of light given off above the given

angle of 60° were the same in all cases, the figures already given would be sufficient to indicate the relative value of the lamps; inasmuch, however, as the light actually given off above 60° varies greatly, as is shown in the table, the second case where light walls and ceilings are given must be considered.

Messrs. Lansingh and Rolph presented a paper at the convention of the Illuminating Engineering Society, in October, showing the increase in horizontal illumination due to light ceiling, light walls, light floor and to the interaction of these different surfaces with one another. The results were noteworthy. The effective angle in this case was about 50°, and an analysis of the light given off above this angle shows that the lumens reflected were between 40 per cent. and 50 per cent. of the total amount thrown against walls and ceiling. This paper, however, was based on purely laboratory conditions.

We may safely assume that in ordinary practice the reflection would not be so high as this. The reflection of ordinary foolscap paper is 70 per cent.; of chrome yellow paper about 62 per cent. In ordinary conditions we should probably get a figure lower than this, the ordinary light buff walls and finish and the tinted ceilings which are commonly met with probably giving a diffuse reflection of less than 60 per cent. This figure, of course, would be for the first direct reflection, which would account for only a portion of the total light under consideration. The rest would have to be 2, 3, 4 and more times reflected before it reached the plane of illumination, losing each time in amount. There would also be a loss in reflective efficiency due to the presence of goods, show cases, doors and windows, hangings, pictures, etc., which would vary very greatly with the different cases.

Assuming, therefore, 25 per cent. as a basis, probably high for the rough calculations in view, we find that by adding 25 per cent. of the lumens given off above 60° to the effective lumens below 60°, the number of lamps required for the specified illumination of 3 candle feet on the plane, is reduced in the case of the open flame burner from 69 to 40; in the case of the bare mantle from 38 to 16. In this case most of the light is given off above 60°. In the case of the "Q" globe, where there is less proportional light given off above 60°, the number is reduced from 33 to 18. The same holds true in the case of the fluted opal reflector, where most of the light is given off below the the horizontal. Here the reduction is from 25 to 14. With the opal dome and bobesche the number is reduced from 21 to 16. It should be stated here that with this equipment the lamps should be hung high, as, owing to the very powerful light immediately below the lamp, the distribution is greatly improved by added height.

The figures bring out another important consideration, namely, that with light walls and ceiling a lamp may be hung higher than would be possible with dark walls and ceiling, providing the same average illumination on the given plane and at the same time insuring greater uniformity.

With the inverted gas burner unshaded the number is reduced from 17 in Case 1 to 11 in Case 2. When the ground glass shade is used the number is reduced from 20 to 13. With the holophane distributing reflector the reduction is from 10 in the case of a dark-walled room to 9 in a room with light walls and ceilings.

Referring to the paper of Messrs. Lansingh and Rolph we find that the reflected light from the ceiling, which represents the greater proportion of the increase due to the light color mentioned, has a very marked effect on the uniformity of the illumination throughout the room, the strongest reflection being directed towards the center of the room. This fact is worth note in laying out installations, for lamps may be placed closer to the walls and with more free space in the center than would theoretically be possible, unless this fact were taken into consideration. This will permit of higher illumination values being given to counters, shelves, desks, etc., than has perhaps been generally the case, at no appreciable loss to the lighting of the room. This condition still further accentuates the necessity of co-operation between architects, builders and illuminating engineers to prevent waste of light by the use of color schemes of low reflecting value. It is likely that in practice the total amount of reflection from ceilings and walls may be reduced below the figure assumed, and for this reason the light giving the best downward distribution will prove more efficient.

There is, further, the advantage of the major part of the light being direct in the case where the prismatic reflector is used, whereas, in the case of the open lamp, a very large part of the light falling upon the plane of illumination is complexly diffused. For purely general illumination the latter case may be desirable, but for any definite work there should be a definite direction to the light, so that fairly distinct shadows may be utilized. It is found also that the purely diffused lighting system entails a serious strain upon the eye, there being practically no shadows on which the retina may be directed when fatigued; the light enters the eye from all directions, below as well as above. This is true to a less extent where the illumination is general and largely reflected from walls and ceiling, as in the case of the bare lamp, but is largely reduced by the use of the reflectors for directing light downwards. The character of the surfaces constituting the plane of illumination, of course, has a very marked effect in this regard, a surface largely light-colored reflecting a great deal of light directly into the eye.

In Case 1 and Case 2 will be found a column showing the consumption of gas per hour required to give an illumination of 1 foot candle per square foot of the plane in question. This data may be found useful for rough determinations of the total amount of gas per hour required for lighting any specified area with a given type of burner. The results obtained in this way will not in all cases allow uniform illumination. To obtain this some variations from the number of lamps determined above would be necessary in cases where a very strong light is concentrated immediately beneath the lamp. In general, however, by a suitable arrangement of the fixtures, fairly uniform results can be obtained with the given number of burners.

Discussion.

The President—This paper shows a greal deal of thought and care. I think we will find ourselves referring to it quite frequently to help us solve illumination problems. The paper is now before you for discussion. I know Mr. Ware will be glad to answer any questions.

Mr. Macbeth—I think the convention is to be congratulated on getting a paper of this character from Mr. Ware. The electrical interests have pretty well up-to-date monopolized the illuminating engineering proposition, but the gas interests are taking it up, and I believe will give a good account of themselves. The electrical people did not have any such a paper at their disposal as has been given by Mr. Ware in anywhere near the comparative length of time from the active taking up of the work. It represents a great deal of mathematical work. The tables given have not only involved day work but a great deal of night work, and should be exceedingly valuable. We should not go by calculations altogether, however—calculations must be mixed with experience; but calculations with experience form a very much better combination than guesswork and experience. There are a couple of points I would like to take up. About the center of the first page Mr. Ware assumes the average intensity of 3 foot candles as being the limit for general merchandise stores. If under that heading "General Merchandise Stores," clothing stores be included, I would like to suggest that the value be raised to include 5 to 7 foot candles for them. This question of the effect of illumination, and the quantities required for different classes of business or work is one that is pretty much unsettled, and it will be unsettled until we have an opportunity to make further investigations with illuminometers. In other words, taking measurements of actual installations as they exist, determining the condition of illumination which is satisfactory to present users. It has been decided by authorities that we have a satisfactory condition of illumination when we have from 1 to 2 foot candles effective in our eye. That is to say, light is reflected to this paper. What we see is the light reflected from the paper to our eye. When this quantity is 1 to 2 foot candles the eye is working at a normal condition, without any strain and with very little chance of fatigue. Regarding the illumination on this paper, we note from the figures here that the coefficient of reflection of paper is about 70 per cent.; that means that we must have 30 per cent. more light on this paper to admit of the proper amount being reflected; that is, 30 per cent. more than 1 to 2 foot candles. When you come to dark goods, where the absorption is probably 90 or 95 per cent., and the reflection but 5 per cent. of the light, it is questionable whether we can to-day get sufficient artificial illumination to come up to the normal condition of 1 to 2 foot candles effective at the eye. In the investigations with illuminometers we are brought up to very peculiar conditions. I investigated a case some time ago in a clothing manufacturer's, where they had an ordinary 8-candle lamp, electric, with ½ shade at about 5 or 6 inches distance from the sewing machine needle, and they were actually getting 80 foot candles on that plane. We are so accustomed to juggling with 2 to 4 and 5, with maximums of 10 foot candles, that the statement of 80 foot candles seems excessive. Besides the intensity, however, we must consider the reflection conditions and the area. The latter was small, a matter of covering an area of about 16 square inches, so that on the question of the amount of illumination

required we will always have to take into consideration the conditions under which it is being used. For window lighting we will frequently run up to 50 or 75 foot candles. When you get window lighting that is satisfactory, then take measurements and find what you have; you may have 15 or 20 foot candles effective on the plane, or you may have 100. Another point here that some of the members would like an explanation on, is the statement of the "60° angle from the vertical," the certain quantity being effective on the plane, with the lamps 4 feet above the plane—I might say that the plane is an imaginary line, either the top of a table or the point where we are using a paper or examining goods. With a height of 4 feet the 60° angle would cover a distance of 7 feet. That distance of 7 feet is the radius of a circle the center of which is directly below the light source and having a diameter, of course, of 14 feet. If the height be raised to 5 feet the diameter of the circle would be 17 feet; 6 feet, 21, 7 feet, 24; 8 feet, 27½; 9 feet, 31. We find that light walls and ceilings have a very considerable effect on the illumination and add very considerably to the amount on the plane. In many cases, with a light wall and a ceiling with units placed pretty high, the results are better than with some reflectors, but reflectors are very important and a great deal more attention can be paid to them than has been given to them in the past. On this question of the absorption of light on a "Q" globe, Mr. Ware gives it as 47 per cent. It seems to me that is a very high figure. It must have been a very dense piece of opal glass. We can get an opaline glass which is of sufficient density that you are unable to distinguish the outline of the mantle in it, in which the absorption is not greater than 15 per cent. In the question of absorption and efficiencies of reflectors, the investigations should be carried through very carefully. Put a mantle burner on the photometer. Take readings of that burner without any shade on it. Then put a shade on and take your readings, maintaining your pressure and your candle power constant. Take the shade off and check again. In no other way can you be in a position to give figures on the absorption of those shades, because, if we take an inverted mantle, take photometric readings, and a few days afterwards take the same mantle, put it on the photometer with a globe, we might actually show that that globe did not have any absorption, but the readings being higher really made light. It is very important when curves are being compared that they are curves from the same photometer at the same time and under the same conditions. It is not fair to take a curve on an inverted burner one manufacturer puts out at a certain time and compare that with some other manufacturer's curves taken perhaps under entirely different conditions. We must know something about the conditions. We should know the pressures under which those tests were made and the quantities of gas consumed at the time. In the center of page 5: "It should be noted here, however, that the inverted lamp should, in general, be hung somewhat higher than has been the custom with the ordinary burners previously in use." I think about 8 feet would give very satisfactory and uniform results. We find a very considerable amount of difficulty in getting people to think that, when that light is where they cannot get their hands on it, they are going to get anywhere near the illumination they could if the burners were lower. You see from the curves here one reason why, with the burners closer to the plane and the distribution of an upright mantle, we could have intensity which, with the inverted burner distribution, requires that the burner must be hung very much higher, otherwise the illumination is confined to a comparatively small area on the floor. With inverted burners and reflectors which confine the greater amount of light within the angles effective on that plane, it makes very little difference whether those lamps are placed between 8 and 12 feet from the floor, provided you have a high ceiling. This is brought out lower down on this other page, in connection with the burner with a bobesche and the question of spotted lighting. I find that if you handle the distribution of your unit in such a way that your minimums are pretty well taken care of, the maximums are not likely to come under the heading of "spotted lighting;" they merely add more to the brilliancy of the general effect. That brings in the question, of course, of just what differences in intensity the eye can note. It has not been decided. I know I cannot find a variation of 33⅓ per cent. with my eye, where it has been shown in actual measurements of the illumination. The tables given should be very helpful in giving us a start; in giving us a something to get a hold of. I have only had the opportunity of checking up one part of the table and that is as to the "inverted lamp with a holophane distributing reflector in a dark room." We had red burlap on the walls, a deep red carpet and a light ceiling. The factor secured at that was .01. I don't know that Mr. Ware has fully explained the value of these factors. If we want to light a room of this character, a room, say 30 by 40. Take the area, 1,200 square feet. We desire an average intensity of 3 foot candles. Three times 1,200 is 3,600 lumens which we require effective on the plane. The lumens effective, multiplied by this factor of .01, give us the cubic feet of gas available for this floor for the desired illumination. Then, should we want to use an inverted burner having a nominal consumption of 3 cubic feet per hour, dividing the 3 cubic feet per burner into the amount secured as available for this floor gives us the number of burners, 12. Then the balance of the calculation is simply a matter of distribution arrangement. If you want to put them all on one fixture we would not have as good a distribution as by using four 3-light fixtures in a room of this kind. Taking the corners of this inside square in the ceiling would give a very uniform and satisfactory effect. I think we are to be congratulated on the work which Mr. Ware has put into these tables for us.

Mr. Owens—I am very glad to hear that Mr. Ware called attention to the fact that prismatic glassware has some absorption. If you ever read one of their advertisements you would never believe it; in fact, I know many people who think it doubles the amount of light. Now, the opal certainly shows up very well against the ground glass as far as absorption is concerned, and is quite as efficient as ground glass, if it is a proper kind of opal glass. Then, this matter of reflectors. A candle is a reflector in itself. The mean spherical candle power of a single candle is higher than the horizontal reading. The candle and its holder is in French "chandelier." According to the table the single lamps with holophane reflectors are more efficient than an inverted gas arc. Well, perhaps so, if you measure the illumination on the floor; but as the comparison is made for store lighting, it seems to me the vertical distribution of which I spoke yesterday is most important. I don't believe the illumination, aided by this wonderful prismatic glassware, would be ahead of the inverted gas arc in store lighting. Of course, Mr. Ware is to be thanked for the great amount of work done to get out this list, but it is not quite long enough. He ought to have put the 1-foot Bijou at the top and the 5-burner gas arc at the bottom. I think these lamps are two of the best on the market, and they certainly should not be neglected. Thank you.

The President—Anything further on this paper? We would like to hear from Captain McKay.

Captain McKay—Let me call attention to the part that science is making in our profession, as shown at this meeting. We began with the scientific manufacture of water gas, and the scientific use of the by products, and the scientific distribution, and now we have the scientific illumination. But when two distinguished illuminating engineers differ, as apparently two statements have differed this morning, I would like to have them explain wherein this difference lies. Mr. Ware has repeatedly in his paper referred to the disadvantage of what he terms intrinsic or initial brilliancy of light, and Mr. Klumpp, when the question of street lighting was under discussion, set forth the great magnitude of the advantage to gas companies in having extremely high powered units. Can't we get this thing on a common basis?

The President—One, I suppose, is outside illumination, the other is inside. That makes some difference.

Mr. Ware—I think nobody would want to live very long in a room with bare mantles staring him in the face all the time. There is no question that it can be endured very much better than any bare electric light, but I don't think there is any question, on the other hand, that it would be very much better to get the same or even a less quantity of light from a larger surface. Even in the street, I think that that is important. The old, open, electric arc, as everybody remembers, was extremely difficult to work with or to travel under, owing to the very high brilliancy of the very small light source. The inclosed arc is a great deal better. The same amount of light is distributed over an area of 2 or 3 square inches inside, and comes out considerably less in volume; but even that could not be stood if the poles were not as high as they are; and even with a 20 or 22 foot pole the light is objectionable. The tungsten lamp, either series or multiple, is open to the same objection, and especially so when it is hung low. The gas lamp for outside work I think has one of its strong points in the comparatively low intrinsic brilliancy, and when we get to the high pressure unit, to which Mr. Klumpp refers, I think we should be very careful to hang it fully as high, if not higher, than the present electric arc. If we get a light source of 8 or 12 square inches, with 3,000 or 4,000 candle power, we want to keep it pretty well out of the range of vision. Mr. Macbeth brought out

some good points. The figure of 3 foot candles which I used as a mean is not, of course, intended to be a criterion for every case. I merely assumed it as being an average which was fairly useful for working out a theoretical problem. As a matter of fact, each actual problem would have to be decided on its own merits, and the figure and the intensity determined in advance, the number of lamps adjusted to suit. The next point was about the absorption of the "Q" globe. I am glad Mr. Macbeth spoke of that. These figures which I have taken, with the exception of the bare inverted mantle and the holophane, distributing reflector, inverted mantle, were taken from "Practical Illumination," and as that was published several years ago, I think the "Q" globe which they tested was probably very much more dense than is commonly used now. At that time the so-called alabaster glassware was not perfected, I believe, and certainly was not used as widely as at present, and the absorption given there is undoubtedly very high. Also Mr. Macbeth's point of testing the same lamp at the same time with the same mantle is perfectly true. As regards the Bijou burner, and the 5-mantle arc, I left out because the Bijou burner is, I think, suitable more for residence work or for small stores, where decorative treatment is needed, than for the larger problems; and, further, the fixture manufacturers have only just begun to realize that it is a lamp worth looking at at all, and we have not yet got any really satisfactory glassware for it. There is no question but it is a first-rate lamp, and it is going to have a very large field, but the fixture manufacturers are characteristically slow in seeing this. The 5-mantle arc I think is too large, too powerful a unit, for the ordinary store. The 3-mantle arc is more powerful than the ordinary inside electric arc, and I don't think that we should advocate the use of a higher powered light unit unless in a very large space, where it can be hung very high, and there I think that perhaps better results could be got by an arrangement of individual lamps with proper reflectors. I did not in the paper take up the use of the two tables of cubic foot per foot candle per square foot, but I think that, as Mr. Macbeth pointed out, this will be found useful for rough calculations in determining the number of lamps required. The results might profitably be checked up by illuminometer tests in different installations, and that is a work which should be undertaken soon. As Mr. Elliott, the Editor of the *Illuminating Engineer*, pointed out to us the other night, at the meeting of the New England Section of the Illuminating Engineering Society, there is a great deal of work which could be collected about the intensities of illumination required for various work. Shops, large stores, auditoriums and factories. There is a very large field. I think the gas interests are letting factory lighting slip from them, and some very heavy work should be put in on that. One other point along strictly illuminating engineering lines that is to determine the effect on the reflective power of ceiling and walls of different positions of the same light. I don't think there is any data on that subject, and there is no question but that the light nearer the ceiling will have a very different effect on the illumination produced on the horizontal plane from what would be secured by the same light or number of lights on the walls, or hung lower.

Mr. Owens—May I make just one more remark? Captain McKay wanted some light on the intrinsic brilliancy. Intrinsic brilliancy is not a good thing; there is no question about it; but in street lighting the public want intrinsic brilliancy, and when they get it they think they are getting their money's worth. I think that is one reason why the tungsten is said to be successful in street lighting, as it has a very high intrinsic brilliancy; but it is a bad thing.

The President—Mr. Klumpp, can you give Captain McKay the "inside illumination" on outside illumination that he asked for?

Mr. Klumpp—I agree with the other gentleman that high intrinsic brilliancy directly applied is not a good thing for one's eyes; but I also want to say I think our streets are very much underlighted, and if we don't go into increasing the illumination of our streets fourfold, probably sixteenfold, the electric people will. If we can do it by high pressure lighting I think we should. We could provide our lighting units with large diffusing globes to reduce the intrinsic brilliancy as much as possible, and place them high. I have seen foreign squares where the sidewalk illumination was probably 5 or 6 foot candles, and one could read fine print easily anywhere. The people gathered in those squares. Light the streets everywhere, and if you have to do it by high pressure do it. I don't mean that the lights should be so low that they would be staring you in the face. Put them high, with artistic fixtures, and close together. Get as many of them as you can. The people would like to see something for their money, if they are paying for the street lighting. I think we can do in our cities what they are doing abroad, even though we have more active and keen competition by the electric lighting interests here. We need the lighting and we need the business—go after it.

Captain McKay—I am glad to see that all these gentlemen are in agreement. I interpret Mr. Klumpp's remarks to mean that he has now injected science into commercial engineering.

The President—With a little advertising. Is there anything further on this subject? If not, we will close the very interesting topic.

On motion of Mr. Snow a vote of thanks of the Association was tendered to Mr. Ware for his paper.

Mr. Lamson Describes Some Worcester Results.

The President—I am going at this time to ask Mr. C. D. Lamson to give a description of his new retort house. I understand that he is not prepared to give the results obtained, but it is interesting to know what a modern retort house is and how it is operated. Mr. Lamson.

Mr. Lamson—Mr. President and Gentlemen: I have been strongly urged by your Secretary to prepare a paper on our new retort house in Worcester for this meeting. While I do not wish to be ungracious in the matter, I think you will agree with me that I may be excused for a time from putting on paper the results of the experiments which we are now making at our works. Over three years ago I began to consider building a new coal gas plant at the Worcester works. I visited very many of the larger and newer works in this country and spent some time abroad in looking into the better and more modern forms of retort houses in use there. I made a very careful study of the various forms of horizontal retorts and settings, charged by hand and charged by machinery; also a great variety of inclined retort installations. I have carefully examined vertical retort plants, both in England and in Germany. I have always been somewhat prejudiced in favor of horizontal retorts, and my investigations have not altered my preference for them. The new retort house at the plant of the Lowell Gas Light Company in this State seemed to me to have some excellent features; and, in fact, I liked this house better in many ways than any other I had seen. The retorts are horizontal. They are of moderate length. They are operated from one end. The machine puts in the coal and pushes out the coke all in one operation. From the time I first saw this house I was very much impressed with it, and I decided that the house, with careful working, would produce excellent results. I now understand that the results obtained in actual practice have been very satisfactory. One limit, however, to this house, as in many others, has been due to the firebrick material in the retorts and settings. That is, the limit of heat which may be used with safety to the firebrick material very materially curtails the capacity of the stack. I decided early in my own mind that the general plan of retorts and methods of charging in use in the Lowell house should be adopted in my own retort house when I should build. The Lowell house was built by the Riter-Conley Manufacturing Company, of Pittsburgh, Pa. They had done a good deal of work for us and it had all proved satisfactory. I therefore, asked them to make me a proposition for a retort house for our works. It was agreed that the general design of the stack used in the Lowell house should be adopted, but it was also agreed that the retorts should be longer; that is, 15 feet in length instead of 13, as in the Lowell house. The Riter-Conley Company proposed to use a new patent firebrick material throughout the stack. The material is capable of withstanding a very high heat. It is called "Ricon Firebrick Material." Since my early connection with the gas business I have always wanted to try a form of furnace operated somewhat after the plan of the Siemens' furnace; that is, having the furnaces detached and apart from the retort stack, making gas and sending it forward into the benches and burning gas and air under the retort settings. This plan met with the approval of the Riter-Conley Company; they, in fact, had it also in mind, and had a very elaborate system embodied in their proposal for our house. There have been introduced into this stack quite a good many notions peculiar in themselves which have been arranged by the Riter-Conley Company, who have been willing at all times to go out of their way to adopt any suggestions which I myself have made. The general form of the retort house is entirely the idea of the Riter-Conley Company. It is novel, different from anything we have seen heretofore, and has worked out exceedingly well in practice. The house is designed for two retort stacks of 10 benches each, one stack on each side of the house. Only one stack is built at the present time. The charging machinery runs through the middle of the house. There are duplicate machines. There is a large coal bin, capable of holding 600 tons, in the top of the retort house. The coal for this bin is supplied by a man trolley car and bucket, built by the Brown Hoisting

Machinery Company. The coal is broken in the coal shed and brought through an overhead runway to the coal bin in the retort house. The coke conveyor is of an entirely novel design and works exceedingly well. The method of handling the coke after it leaves the coke conveyor is unique and exceedingly satisfactory in working. The house is very well lighted. There is a continuous row of windows around the house, and light also comes through the roof. The ventilation of the house is exceedingly good. The contract for the house was made in October, 1906. It was agreed that the house should be ready to make gas on the first day of October, 1908. The work was carried on quietly and satisfactorily in every way, and it gives me great pleasure to state that the first gas was made, as agreed, on the first day of October, 1908. We have tried many experiments since that time. At first we started with 8-hour charges and soon reduced to 6-hour charges, and afterwards to 5-hour charges. Running in this way we produced a very large amount of gas per retort and per bench. The stack was found to be capable of producing very large results. Later we changed back to 6-hour charges and ran for about 2 months, in this way getting very valuable figures. On the 1st of January we changed to 7-hour charges, which is the method of working at the present time. We have decided that, all things considered, this is the best form of working. The results from the stack have been large. In fact, so large that I am disinclined, as I stated before, to put them on paper and give them out for publication. The candle power is very satisfactory. The make per pound of coal is large, as is also the make per retort and per bench. The heat units are unusually high. The tar is exceedingly fine and limpid. The coke, I think, is better than any other coke I have ever seen in practice anywhere, equal, almost, to the 72-hour oven coke. As I said before, we do not wish, at the present time, to give any figures at this meeting that shall be set down as a declaration on our part of the working results. We shall be very glad to have any persons who desire to do so visit the Worcester plant, look over the house and judge of it for themselves. We are carrying on an exhaustive set of experiments, also examinations, of the working details by experts, and a little later on I propose to write a very careful paper in regard to the whole design of the house in all its parts, and also give a careful statement of all the results we have obtained. Mr. Barnum will join with me in this paper and give a full statement of the technical work which we have undertaken. When I have completed this paper I shall be very glad to furnish any member of the Association with a copy of the same if he desires it.

The President—Mr. Lamson, in behalf of the Association I thank you for this description of your retort house, and for the kind invitation to visit your works.

Mr. Lamson—I shall be very glad indeed to have everybody come, and we will there talk with them about the results, but we will not talk for publication.

The President—Thank you. Our next paper is that by Mr. L. J. Willien, of Springfield, Mass., entitled

A COMPARISON OF THE ENRICHING VALUES OF BENZOLE AND GAS OIL.

The papers on the subject of benzole enrichment presented before the Association during the past year have treated the subject either from the practical or theoretical side, while the writer has taken the results of a set of laboratory tests to form the basis of this paper.

In the fall of 1907 the question of benzole enrichment came up, and some data being asked for regarding the enriching value, so the following tests were made.

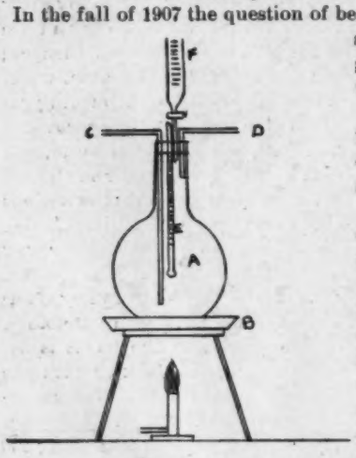


Fig. 1

The method employed for determining the enriching value of benzole was practically the same as the one given in Abady's "Gas Analysis Manual." The carburetter used for vaporizing the benzole is shown in Fig. 1. *A* is a large, round bottom flask, heated by a sand bath, *B*; *E* is a thermometer, and *F* a burette. The gas, after passing through an experimental meter, entered *A* at *D* while the benzole was introduced from *F* and, being vaporized, was mixed with the gas, leaving the carburetter at *D*, passing into a small gasholder, shown in Fig. 3. After sufficient gas had passed through the apparatus to fill the small holder, it was run through the photometer and the candle power determined. The candle power of the unenriched gas was taken while the gas was passing through the apparatus—a branch of the main from which the gas used in the experiments was drawn ran to the photometer. In all the work the candle power is the average of three sets of readings, each set consisting of 10 observations. A London Argand burner, style F, was used.

The benzole used was of a decided straw color and had a specific gravity of 0.895 or 27° B. at 60° F. The following are the results of a distillation test:

Temperature Degrees F.	Per Cent Distilled Over.	Color.
Up to 112.....	80.6	Clear.
212-250.....	13.5	Very light yellow.
Residue.....	4.2	Dark red.
	98.3	

The sulphur was 0.93 per cent., being determined by burning the benzole in a Mahler-Atwater bomb calorimeter.

The results of the tests made are given in Table I. They do not check within 50 per cent. any of the results given in text books or those which are claimed to be obtained in practice. The fact that the results are lower than those obtained in practice seems exceedingly strange, for as a rule the results obtained in the laboratory are in nearly all cases higher than those obtained in practice.

Another method for determining the enrich ing value of benzole was tried. This method was an original one, and the apparatus employed is shown in Fig. 2. It is a regular apparatus used for testing for hydrogen sulphide in gas. It consists of a glass bell *B*, which sets in a groove *D* in a circular iron plate, the groove being filled with mercury which acts as a seal. *A* is a flat flame, No. 5 Bray burner, which is fitted on a piece of ¼-inch threaded pipe that runs through a cork in the top of the glass bell. *E* is an iron pipe which is fitted in the center of the iron plate, the upper end being closed by a cap. *H* is a bushing for making connections on a glass pipe. There are 3 needle points *C* fastened onto *E*; directly under each is a very small orifice.

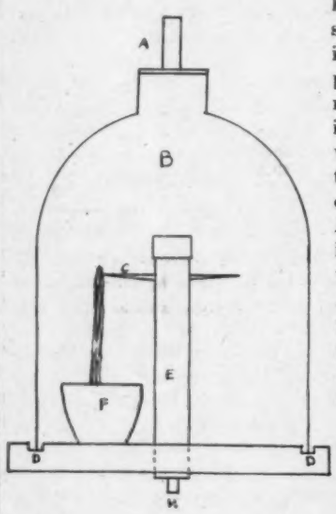


Fig 2.

In the enriching tests the apparatus was placed in the photometer (the Argand burner being removed). The benzole was put in a porcelain crucible *F* and placed inside of the apparatus (the glass bell being easily removed). A piece of wicking saturated with benzole was fastened to one of the needle points, the other end dipping in the benzole. The gas flowing from the small orifice beneath the needle would pass through the wicking and carry the benzole with it. As the benzole was carried away more would be continually drawn up from the crucible by the wicking, in the same way that oil is drawn up in a lamp.

First, the gas was run through the apparatus and the candle power determined, then it was shut off, the reading of the photometer meter taken, and the crucible with the benzole and wicking in it (both having just been weighed) was put in the apparatus and the wicking fastened to the needle. After putting the glass bell in place, the gas was turned on and allowed to run for about half an hour, candle power readings being taken at various intervals, when the gas was shut off, the glass bell was immediately removed and the crucible reweighed, the loss in weight being the amount of benzol vaporized, which divided by the specific gravity gave the volume. In weighing no attempt was made to weigh closer than .01 gram, on account of the benzol vaporizing so rapidly. The meter reading was taken again, which, together with the first, gave the volume of gas enriched.

A second candle power reading was taken on the straight gas to see if it had changed; if so, an average was taken.

By the above method it would seem that one would obtain the

TABLE I.

Experimental Number.	Kind of Gas Enriched.	Cubic Centimeters of Benzole Used.	Cubic Centimeters Per Cubic Foot of Gas.	Volume of Gas Enriched Corrected to N. T. P.	Temperature at which Benzole was Vaporized. Deg. Fahr.	Candle Power.			Enriching Value in Candle Feet Per Gallon.
						Before.	After.	Increase.	
1	Coal.	10.0	2.31	4.330	210	12.2	16.7	4.5	7,161
2	"	5.1	1.16	4.332	210	12.9	17.6	4.7	15,141
3	"	5.8	1.26	4.614	210	13.0	17.5	4.5	13,626
4	"	4.5	1.05	4.286	218	13.1	17.1	4.0	14,383
5	"	5.8	1.37	4.237	210	13.2	17.2	4.0	10,977
6	"	5.7	1.27	4.255	220	13.2	16.9	3.7	10,598
7	"	2.3	0.54	4.255	200	13.5	14.7	1.2	8,327
8	"	5.0	1.19	4.187	210	14.2	17.5	3.3	10,467
9	"	5.2	1.10	4.674	200	14.5	16.1	1.6	5,413
10	"	9.3	2.11	4.415	185	14.5	17.7	3.2	5,753
11	"	3.7	0.79	4.697	215	14.6	16.1	1.5	7,305
12	"	8.3	2.00	4.154	212	14.7	19.8	5.1	9,614
13	"	3.3	0.78	4.224	205	15.5	17.6	2.1	10,220
14	"	3.1	0.73	4.255	212	16.0	17.6	1.6	8,327
15	"	11.2	2.62	4.286	215	16.6	20.2	3.6	5,185
16	"	6.0	1.44	4.154	212	17.4	21.6	4.2	10,967
17	"	7.7	1.61	4.154	212	17.6	20.9	3.3	6,813
18	"	5.0	1.10	4 535	240	17.9	19.4	1.5	5,148
19	"	4.4	1.04	4.228	212	17.9	19.0	1.1	4,000
20	"	4.8	1.15	4.155	205	18.0	19.2	1.2	3,936
21	Comm.	8.7	2.11	4.120	230	17.7	20.7	3.0	5,304
22	"	4.3	1.09	3.960	220	16.7	18.9	2.2	7,684
23	"	3.0	0.67	4.490	220	16.8	18.5	1.7	9,690
24	"	3.0	0.67	4.490	210	16.2	17.9	1.7	9,690
25	"	3.2	0.71	4.490	210	16.0	17.8	1.8	9,538
26	"	2.3	0.51	4.490	210	16.0	17.6	0.7	5,850

maximum enriching value, as there was practically no chance for condensation. The following results were obtained:

c. c. of Benzole Used.	Vol. of Gas Enriched Corrected to N. T. P.	Candle Power			Enriching Value in Candle Feet per Gallon.
		Before.	After.	Increase.	
6.4	3.677	9.6	23.6	14.0	30,280
8.3	3.372	9.8	26.7	16.9	25,993
5.3	3.961	8.9	19.6	10.7	30,180
6.0	3.264	8.8	22.0	13.2	27,176
Average					28,407

The above results agree more closely with those obtained in practice, also with the enriching values that are given by men considered as authorities. Some of the values given by men who are considered as authorities are as follows:

	Candle Feet per Gallon.
Knublauch	37,000
Bunte	24,000
Franklin	29,000

In order to see if there would be any appreciable drop in the enriching value, due to the benzole condensing out of the gas by coming in contact with metallic surfaces, the apparatus was placed out in the laboratory and connected up in such a way that the enriched gas before reaching the burner in the photometer passed through about 30 feet of new iron pipe. Tests were made with an Argand burner, also a flat flame No. 5 Bray burner. The following results were obtained:

Argand Burner.

c. c. Benzole Used.	c. c. per Cubic Fcot.	Vol. of Gas Enriched Corrected to N.T.P.	Candle Power			Enriching Value in Candle Feet per Gallon.
			Before.	After.	Increase.	
5.8	0.57	3.333	16.0	19.5	3.5	7,570
4.9	0.68	3.328	16.5	19.7	3.2	8,213
4.4	0.72	3.182	16.1	19.0	2.9	7,949

Flat Flame Burner.

3.7	....	3.299	10.9	15.4	4.5	15,140
6.0	....	4.249	11.3	17.9	6.6	16,789

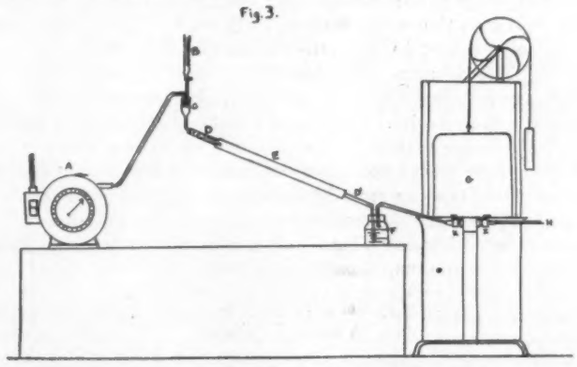
On comparing the results obtained with the Argand burner with those shown in Table I., where practically the same amount of benzole per cubic foot was used, they check fairly well, and together with the results obtained with the flat flame burner, show there is an appreciable drop in the enriching value by the enriched gas coming in contact with metallic surfaces. I am sorry I have not any more tests on the flat flame burner, but I had an explosion that destroyed the apparatus, and I did not have nerve enough to work any more with it.

GAS OIL.

After completing the above tests on benzole, some data was wanted on the enriching value of gas oil, other than the figures obtained in everyday practice, which is expressed in candle feet per gallon. In order to obtain the data it was necessary to devise a method, as the usual laboratory tests made on an oil to determine its fitness for gas making purposes, or to compare it with other oils are: Specific gravity, flash and fire points, distillation test and sulphur determination. The flash and fire points are only of indirect importance in indicating the precautions to be observed to prevent inflammation during transport or storage.

A sketch of the apparatus is shown in Fig. 3. *A* is a wet test meter; *B*

Fig. 3.

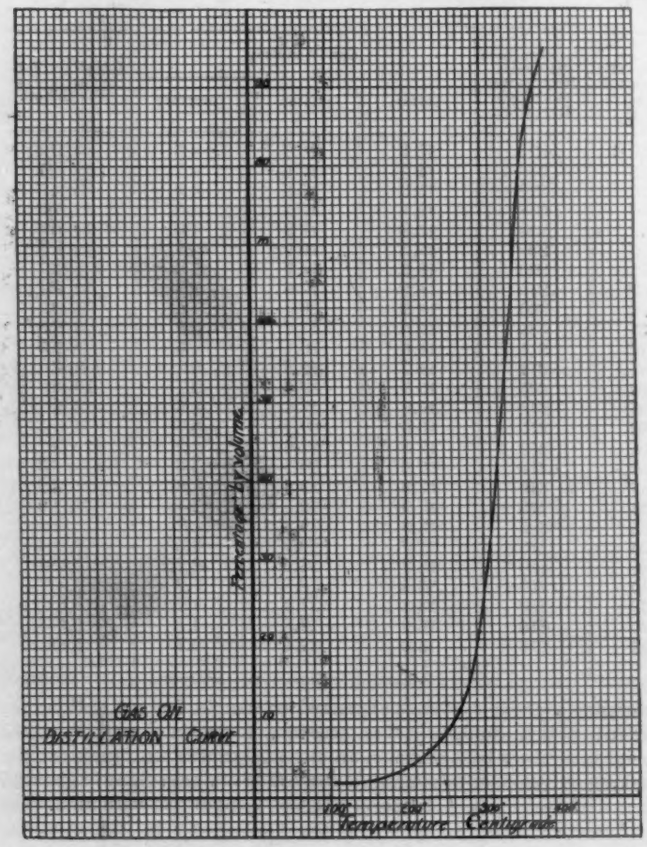


a 50 c.c. burette; *E* is an iron pipe 1 inch diameter and 30 inches long; *D* and *D*¹ are ¼-inch pipes, about 15 inches long, fitted into the caps at each end of *E*; *F* is a washbottle and *G* a meter prover of 5½ cubic feet capacity. The gas after passing through *A* passed up into *C*, the oil being introduced at this point from *B*. From *C* the oil and gas were led into *E* through a piece of glass tubing, which was fitted inside of *D*. *E* was heated up to 1,550° F., that being the temperature at which we cracked the oil in practice. In this way the oil was cracked and mixed with the gas passing through. From *E* the carburetted gas passed through *D*¹ into *F*, then into *G*. From *G* the gas was run through *H* into the photometer.

The meter prover was graduated so that the volume of gas in it could be read. By taking the difference between the amount of gas that passed through *A* and the volume in the prover at the end of the test, it was possible to determine the volume of gas formed by the oil.

The oil used in all the tests was a mixed sample of 15 cars that had been received. It had a specific gravity of 33.2° B. at 60° F. The results of a distillation test are plotted in form of a curve on a separate sheet. The sulphur was 0.18 per cent., determined by the same method used with the benzole.

First, a series of tests were made to see if subjecting the gas to the temperature reached in *E* would cause any appreciable drop in candle power. A drop of 15 per cent. was found in the commercial gas and



10.4 per cent. in the coal gas. In calculating the results this drop was taken into consideration.

The results are given in Table II. They seem to vary in almost a direct ratio with the amounts of oil used, especially with the coal gas, and there is a certain amount where the maximum efficiency is reached. The volume of gas made per volume of oil is considerably higher than results obtained in practice, being greater in the coal gas than in the commercial. That would be expected, as the commercial gas contains more than twice the amount of hydrocarbons than the coal gas (where mixed gas is put out), and it stands to reason that the coal gas would take up more hydrocarbons than the commercial. A test made with a regular water gas machine, by making gas for 10 runs without using any oil and observing the make per run, then making gas in the usual way, introducing oil and observing the make per run, showed that carburetted water gas in which about 3.80 gallons of oil per 1,000 is used contains about 65 per cent. straight water gas or "blue gas" and 35 per cent. oil gas. Those figures show that in practice about 700 volumes of gas is made per volume of oil. Practically the same results are obtained in making Pintsch gas.

A test of the enriching value was made on a practical scale, the summary of which is as follows:

Coal gas, 1,970,000 cubic feet, C. P. = 16.1.
Water gas, 1,269,000 cubic feet, C. P. = 20.4.
Mixed gas, 3,239,000 cubic feet, C. P. = 18.3.
Increase in candle feet due to oil = 27,557,000.
Oil used = 4,530 gallons.
Enriching value = 6,080 candle feet per gallon.
Oil efficiency in water gas 5.73 candles per gallon.

In figuring the enriching value of the oil, the difference between number of candle feet in coal gas enriched and the number of candle feet in the mixed gas was taken, then the increase was divided by the gallons of oil used. In that way a higher value is most always obtained than that found for the oil efficiency found in the regular way.

A few tests were also made on a practical scale with bonzole by making a low candle power water gas and building it up with benzole. An average of five tests gave an enriching value of 20,000 candle feet per gallon. While the results are probably low compared with some of the results obtained at different plants around New England, still they are higher than those obtained in the laboratory. The reason for that is probably due to the fact that in the laboratory the enriched gas came in direct contact with metallic surfaces, while the service mains are coated more or less with naphthaline and tarry matter, which prevents the gas from coming in contact with the metallic surface of the pipe.

Discussion.

The President—We have had a valuable addition to our information on this subject. I shall be glad to have you discuss the paper or ask any questions. Mr. Prichard, won't you start off? You have had some experience with the use of benzole.

Mr. Prichard—There is nothing I can add to what I have said already. We have used benzole for several years now with very considerable financial benefit. Our results, as I recollect them, run somewhere from 25,000 to 30,000 gallons of benzole. We have never noticed in the practical working any such variation in the results as the gentleman has shown in the laboratory tests. I believe there is nothing further of interest that I can add.

Mr. Kennedy—Mr. President, I want to ask the writer a few questions. On page 14 there seems a curious range of coal gas differences "before": 12.2, 12.9, 13, 13.1, 13.2, 13.5, 14.2, 14.5, 14.5, 14.6, 14.7, 15.5, 16, 16 6, 17.4, 17.6, 17.9, 17.9, 18-candle power. That looks very much like the result of a direct test on a charge from the beginning to the end, the average of which would be 15 candles. On page 19 the average candle power given of the coal gas is 16.1. I would like to know whether that series of candle powers taken has not some

TABLE II.

Experimental Number.	Kind of Gas Enriched.	Cubic Centimetera of Oil Used.	Cubic Centimeters of Oil per Cubic Foot of Gas.	Volume of Gas Enriched Corrected to N. T. P.	Volume of Enriched Gas Corrected to N. T. P.	Volume of Gas Formed by the Oil Calculated to c.c. of Gas Per c c. Oil.	Candle Power.			Enriching Value of Oil in Candle Feet Per Gallon.
							Before.	After.	Increase.	
1.....	Comm.	10.9	2.60	4.200	4.400	520	13.6	18.7	5.1	7,770
2.....	"	7.1	1.73	4.106	4.420	1,255	12.8	16.6	3.8	8,327
3.....	"	8.5	2.13	4.000	....	....	13.7	17.7	4.0	6,813
4.....	"	3.4	0.83	4.090	....	....	13.8	15.0	1.2	5,400
5.....	"	5.9	1.44	4.092	4.207	891	15.0	18.1	3.1	8,024
6.....	"	14.5	3.83	3.789	4.149	578	15.0	20.8	5.8	5,753
7.....	"	8.2	2.13	3.843	4.175	1,146	13.9	17.9	4.0	7,191
8.....	"	7.4	1.88	3.931	4.240	1,182	13.9	17.6	3.7	7,456
9.....	"	11.4	3.34	3.412	3.784	835	13.6	18.7	5.1	6,791
.....	....	....	....	....	Average.	915	....	...	Average.	7,058
10.....	Coal.	8.2	1.81	4.526	4.881	1,226	15.1	18.1	3.0	6,283
11.....	"	5.1	1.20	4.250	4.498	1,376	14.8	18.2	3.4	10,598
12	"	10.2	2.62	3.898	4.256	922	14.8	17.7	2.9	4,201
13	"	5.4	1.74	3.163	3.426	1,379	12.8	15.8	3.0	6,673
14	"	5.6	1.48	3.771	4.122	1,775	15.7	19.0	3.3	8,706
15.....	"	3.8	0.99	3.849	4.130	2,085	12.6	16.3	3.7	14,000
16.....	"	3.6	0.94	3.838	4.095	2,016	13.4	16.7	3.3	13,247
17.....	"	3.6	0.90	4.000	4.257	2,022	14.9	16.7	1.8	7,708
18.....	"	3.7	0.92	4.000	4.265	2,041	13.4	15.3	2.1	8,592
19.....	"	3.9	0.98	3.984	4.214	1,869	12.3	15.5	3.2	12,377
.....	....	....	....	....	....	1,671	....	....	Average.	9,239

direct bearing on the period of charge to charge. Why has it that peculiar rise?

Mr. Willien—Replying to Mr. Kennedy's question, in making a test it would take probably an hour or so in allowing the gas to run through the carburetter and then into the holder, and that these tests cover a period of probably 2 or 3 weeks. That is, not more than one or two tests a day were made, and, of course, the gas that was tested came off at different periods of the charge. The test on a practical scale was made after the laboratory tests, and the coal used at that time was a different kind of coal. On an average in practical work it gave about 16-candle power.

The President—Any other questions that any of the gentlemen would like to ask?

Mr. Ramsburg—I would like to ask if the gravity of the residue in the cup *F* was taken after the gas had been passed through the apparatus, as shown?

Mr. Willien—No test of gravity was made, but I did make some tests in allowing it to run along, to see how complete the evaporation would be. It evaporated completely and no apparent residue was left in the cup.

The President—Anything further?

Mr. Ramsburg—I should like to bring out a point which may not perhaps be understood, namely, the explanation for the apparent discrepancy in the figures given by Knublauch, Bunte and Franklin, and those obtained by Mr. Willien. The figures given by the authorities named are with practically pure benzole, which should not be confused with the enriching benzole of commercial use. The benzole as shown by Mr. Willien as having been used in the course of his experiments is not a very high grade. It contains about 13½ per cent. of toluene and xylene, and 4.2 per cent. of residue, which fact, of course, affects the enriching value. Toluene and xylene of themselves have a higher photogenic (candle power) value than benzene, particularly as a vapor considered volumetrically; but the difficulty is, ordinary illuminating gas will not carry any great quantity of these vapors, particularly if an excess of benzole is present. For example, any gas containing none of these compounds or vapors miscible with them, will carry almost 12 gallons of chemically pure benzene per 1,000 cubic feet. The presence of only a small quantity of toluene, xylene and higher homologues of this series will reduce this tremendously. So that the matter comes down to a consideration of the material, and to a consideration of the actual candle power value of the material used, rather than to the amount of material put into the enrichment. The poorer the material and the more candle power added, both, will effect the apparent value of the material used. Referring to Fig. 3. I should like to ask whether there was not an accumulation of considerable tar in the vessel *F*. I think there must have been, from the general layout, under which conditions the gas in G would have been subjected to considerable tar scrubbing. I would also like to ask whether there was not considerable condensation, in proportion to the amount of benzole used, in the holder G, during the benzole test? This would account for the poor apparent enriching value. You will also note that, in Fig. 2, all the material went into the flame; in other words, the amount of benzole used in the average enrichment was made by a difference in weight, thereby causing a very high enriching value of the material in the second set of experiments. The use, also, of the London Argand burner, style F, in this experiment, would result in showing a very low enriching candle power to the benzole, inasmuch as the London Argand burner of that type, with a standard air admission, would not allow you to take advantage of the enrichment by admitting sufficient air to combust the enriched material to the best advantage. If a Carpenter burner, for instance, were used in these experiments, and the highest candle power attainable at each one of these different additions of candle power, I think the enriching value would have been much more uniform and much greater.

Mr. Willien—Replying to Mr. Ramsburg's question about the collection of tar. There was a considerable collection of it in *F*. Of course, for each experiment the bottle was emptied out and fresh water put in. It really did not seem as efficient as it might have been. I think a good deal of the tar was carried on with the gas, which probably would account for the extraordinarily high values obtained on the enriching value of oil. I did not notice any condensation of the benzole in the holder there during the test, but I did notice that if I introduced the benzole too rapidly it would condense out in the tube *D*, leading out of the flask in Fig. 1. By shutting off the supply of benzole for a few minutes, and allowing just the gas to run through, it would all disappear again, showing that it had been picked up.

The President—Anything further on this question? Mr. Miller, we shall be glad to hear from you on this subject.

Mr. Miller—I never had any personal experience in enriching with benzole, I can hardly add any practical data to this discussion.

The President—If there is nothing further, and no other questions, we will close the discussion.

On motion of Mr. Anderson a vote of thanks from the Associati on was tendered to Mr. Willien for his paper.

(To be Continued.)

HENRY T. DUKE it is noted is one of the prime movers in the attempt to secure official sanction for the construction and carrying on of a gas plant in Kutztown, Fleetwood, etc., Pa. Many of our readers will remember Mr. Duke.

[Continued from page 976.]

PROCEEDINGS, FIFTH ANNUAL MEETING, ILLINOIS GAS ASSOCIATION.

HELD IN CHICAGO, ILLS., MARCH 17TH AND 18TH, 1909.

SECOND DAY—MORNING SESSION.

The President—The first business this morning is additional elections to membership in the Association. The following applications have been approved by the Executive Committee:

Active.

Horace H. Clark, Chemist, Northwestern Gas Light & Coke Co., Evanston.

H. C. Higgins, Builder and Owner of Gas and Electrical Properties, Centralia.

J. G. Light, Manager, Ottawa (Ills.) Gas Light Co.

R. G. Light, Asst. Supt. of Distribution, Ottawa (Ills.) Gas Light Co.

C. L. Owen, Mgr., New Business Dept., Springfield (Ills.) Gas Light Co.

F. W. Vilven, Dist. Mgr. Fox River District, Western United Gas & Electric Co., Batavia.

W. A. Wilson, Supt., Rockford (Ills.) Gas Light & Coke Co.

Associate.

C. T. Chisholm, Traveling Representative, General Gas Light Co., Kalamazoo, Mich.

Chas. H. Claiborn, Mgr., Union Mining Co., Baltimore, Md.

J. C. Goodale, Jr., Salesman, Kalamazoo (Mich.) Stove Co.

N. J. Leakey, Asst. Secy., Michigan Ammonia Works, Detroit, Mich.

Alfred G. Lloyd, Vice-President, Lloyd Construction Company, Detroit, Mich.

James A. Reilly, Sales Agent, the Queen City Coal Company, Cincinnati, O.

H. D. Schall, Representative Gas Stove Dept., Detroit Stove Works, 2921 South LaSalle street, Chicago.

R. I. Speer, Sales Agent, Western Gas Construction Company, Fort Wayne, Ind.

John S. Unger, Gas Engineer, 613 New York Life Bldg, Chicago.

B. W. Vaughn, Representative, Laclede-Christy Clay Products Company, St. Louis, Mo.

Leigh Wickham, Salesman, Parker-Russell Mining and Mfg. Co., St. Louis, Mo.

John Wysocki, President, Aurora (Ills.) Illuminating and Mantle Company.

H. Zitzewitz, President, National Machine Works, Sheffield and North avenue, Chicago.

ELECTION OF ADDITIONAL MEMBERS.

The President—What is your pleasure, gentlemen, regarding these applications?

On motion of Mr. H. S. Whipple the Secretary was instructed to cast a ballot of the Association for the election of the persons as members.

After the usual procedure the applicants were declared duly elected.

COMMUNICATION BY MR. R. B. BROWN.

The President here read a communication from Mr. R. B. Brown, Chairman of the Technical Committee of the American Gas Institute, which was ordered suitably acknowledged.

ELECTION OF OFFICERS.

The President—Is the Chairman of the Committee on Nominations ready to report, Mr. Goodnow? Before Mr. Goodnow reports, I will call your attention to the fact that the officers to be elected come under the new by-laws. We have, therefore, to elect a President, a Vice President, a Secretary-Treasurer, and four Directors, two of whom will be elected this year for 2 years, and two for 1 year, and hereafter we will elect two Directors every year for 2 years.

Mr. G. F. Goodnow—Mr. President and Gentlemen—The Committee on Nominations beg to report the following list of nominations, according to the new by-laws:

For President—Mr. E. G. Schmidt.
For Vice-President—Mr. H. S. Whipple.
For Secretary and Treasurer—Mr. C. B. Strohn.
For Directors—(To serve 2 years)—Mr. Irwin Rew and Mr. E. H. Negley.—(To serve 1 year)—Mr. C. L. Day and Mr. George F. Goodnow.

The retiring president, according to the by-laws, will be a member of this Board automatically. We also recommend the election of Mr. H. L. Rice, as representative to the American Gas Institute, following the precedent established last year by the selection of Mr. J. H. Eustace for this representation.

The President—Gentlemen, you have heard the report of the Committee on Nominations. What is your pleasure?

On motion of Mr. E. E. Morrell the Secretary was instructed to cast the ballot of the Association for the gentlemen named by the Committee to serve as officers for the year.

RESPONSE OF PRESIDENT-ELECT SCHMIDT.

The President—May we hear from Mr. Schmidt?

Mr. Schmidt—Mr. President and Members of the Association: I appreciate the honor you have conferred on me, but am afraid you have

made a mistake. In the two companies with which I am connected I am the laziest man of the whole outfit. I make all the other fellows do the work. I shall expect this year that the members of this Association will do the greater part of it. No one man can make a success of an association or of a company. He must have the hearty co-operation of his employees or the members, and I sincerely hope, in the coming year, I will have the hearty co-operation of not only the officers, but every member of this Association. I thank you. [Applause.]

The President—May we hear from Mr. Whipple?

RESPONSE OF MR. WHIPPLE.

Mr. H. S. Whipple—Gentlemen, I thank you for the honor you have conferred upon me. It was unexpected. I did not have an inkling about it. I assure you you will have my hearty efforts to make the Association a success. I thank you, gentlemen. [Applause.]

The President—Rather than call on Mr. Strohn for any remarks I am going to ask some member to move that he be given a vote of thanks for his work as Secretary the past year. The President knows the tremendous amount of work that devolves upon the Secretary of any Association. He serves without compensation and it is truly a labor of love.

Mr. G. F. Goodnow—Mr. President, I certainly appreciate Mr. Strohn's efforts, and I think every member does. I am very glad to make such a motion, and I am sure it will be carried. [It was carried, if a ringing "Yea" may be taken for such affirmation.]

The President—Has anyone any new business to present to us?

THE PRESIDENT IS REMEMBERED.

Mr. J. B. Howard—Mr. President, I know what your modesty is, but I do move you, sir, that the thanks of the Association be tendered to our retiring president, Mr. Rice, for the able manner in which he has brought out this convention. I move that a vote of thanks be tendered to him by a rising vote. [The motion was duly seconded and, on being put by the Secretary, was unanimously carried by a rising vote.]

The President—Gentlemen, I appreciate that very much. We have this morning two papers, the first of which is a paper by Mr. Robert B. Harper, on "The Comparative Value of Various Coatings and Coverings for the Prevention of Soil and Electrolytic Corrosion of Iron Pipe."

[Owing to an accident that happened in the getting up of the cuts for the Harper paper, we will here give the other one just a trifle out of its order. It is by Mr. L. S. Bigelow, of New York, and is on the subject of

COMMERCIALISM.]

I do not know but it may be safe to say that the fundamental principle underlying true commercialism in its broadest sense dates with the creation, when it was demonstrated that "Order is heaven's first law." Out of chaos came creations; the sea, the land, the light, etc. It was certainly a commercial proposition, for without the light and the land the products of the earth would not be available and sure it is that from the underlying strata and from the face of the earth come those things which make it possible to trade, and "trade" is commercialism. There is the legitimate and the illegitimate in trade. For instance, Esau sold his birthright for a mess of pottage; a trade that ever since has been condemned, but it indicated the existence of distinctive commercialism, in that early day.

We can find all the way through history the visible manifestations of commercialism. The diplomat is a commercial man, for it is through his efforts, in many instances, that trade is created and remains undisturbed between countries. The engineer is, in a sense, a commercial man, because his endeavors are aimed at the producing of that which, when disposed of, shall bring a return. It is quite possible, one can see, that an engineer may be a commercial man, but I think it would be difficult to point out how the purely commercial man could be considered an engineer, unless of that special sort that has come into view during these later days; namely, the "Business Engineer."

"Commercialism" is indeed an exceedingly broad term and might be considered as covering everything, from the chopping of the tree, the tilling of the soil and growing of wool, to the selling of the finished product, or from the boring of the well to the operations of producing light, heat and power from the products of the well, or from the mining of the coal and the ore, to the finished piece of mechanism. In fact, we might go back to our citing of the "engineer" and state that he who surveys the land or who drafts the design is the man with whom commercialism in these days originates, but to bring this broad term into the scope of "gas commercialism" shall be the object of this address.

At the last meeting of the Canadian Gas Association, in Toronto, having been called upon to address that body on the subject of "gas commercialism," I pointed out how the manufacturer of appliances, through the mediums by which gas is converted into light, heat and power, is the Alpha of gas commercialism, while the commercial man of the gas company and the merchant who sells gas appliances may be looked upon as the Omega of gas commercialism; and certain it is that the Alpha would be incomplete without the Omega, and that the Omega would be incomplete without the Alpha; therefore, my deduction would be, that, as each is of equal importance to the general gas enterprise, each should receive the same measure of consideration by the industry.

I have, for a long period, felt that the value of the manufacturer of gas appliances to the gas interests of the country has not been fully appreciated. In fact, I don't believe that the ability of the appliance manufacturer, and the value of that ability to the gas man and to the gas industry are as yet fully comprehended by many a gas man.

It was a great pleasure to me, in promoting the organization of a Gas Association along strictly commercial lines, to have the appliance man recognized equally with the gas man in the membership. It was one of my suggestions that this be done, believing fully that such an organization should stand for breadth, not narrowness; the broadest commercialism, in its purpose of bringing together the three outlet sections of the gas industry; the manufacturer of appliances; the commercial gas man, and the merchant who handles gas appliances.

In regard to this last named class of men I believe it will be of great benefit to the industry at large if the merchant can be generally brought into closer touch with these two other bodies of men in the industry, and thereby a better understanding be created between the manufacturer of appliances, the merchant and the gas man. Although there are many who feel that the successful gas man will never relinquish to the merchant the handling of the sales field of appliances, I am not at all convinced personally that the time will not come when the commercial departments of a large number of the gas companies will seek the close co-operation of the merchants. This does not say that certain trade is not already so conducted, nor does it say that some gas companies, having tried the plan of interesting the merchant, have found it a success, as they conducted it. Nor does the fact that some gas companies have sought co-operation on the part of the merchant and have failed of arriving at a successful issue, indicate to me that the plan is a general failure, for certain it is that some men will make a success where others fail, and perhaps the company that has not made a success of the plan might have done so had the matter been handled differently, or had the time been more nearly ripe for it.

I am reminded of the story of two Irishmen, one of whom killed a snake. Later the two came along to where the snake was lying and found its tail still moving. The first said that the other could not have killed the snake, while the second as firmly stated that he knew he had, because he killed it. The other, however, solved the problem by stating that he guessed that the other had killed it, but that the fool thing didn't know it was dead.

You see on every hand those who are dead, but don't know it. This applies to gas companies, to merchants, to manufacturers of appliances and to individuals. The great regret is that frequently the "dead one" discovers that he is dead too late to revivify. I heard recently of a manufacturer who contracted with a selling agent for the sale of his wares. The selling agent was in line to consummate a deal and he communicated the fact to the manufacturer, who at once took the matter up with the possible purchaser and so schemed as to have the order placed direct, thus saving to the manufacturer his commission to the middle man, though giving to the purchaser somewhat of a discount. Such a concern is one of the "dead ones," for it is sure to be found out, and there will be those in the trade who will have nothing to do with it and others who will work to its disadvantage. So with the gas company that only half-way works with or protects the merchant with whom it has agreed to co-operate.

There are gas companies that, through "good fellowship" on the part of the one controlling the purchases, will buy inferior devices and put them out in the community, instead of buying the best when offered them by merely an acquaintance, not one who has gotten into the good graces of the prospective buyer and is, therefore, not by him looked upon as a "good fellow." A gas company that will thus conduct its business, or allow it to be thus conducted, is one of the "dead ones," as is sure also to be the one in particular that induced the condition.

The solicitor who wittingly, or through ignorance unwittingly, fails to advise his employer's prospective customer exactly according to the facts of the case, be it temporarily to the advantage or disadvantage of his employer, is one of the "dead ones."

It pays to be frank and honest with your prospective customer, and although you may see an opportunity to introduce a device that is not needed or explain away a grievance, instead of eradicating the difficulty, such acts are sure to be the shadows that indicate the "coming event;" namely, that the one performing such inexcusable acts will wake up to the fact that he is dead, too late to resuscitate himself in that field.

In a talk recently with one who is enthusiastic over the desirability of a technical education, I argued that without a very strong mixture of thorough commercialism it would result in his drawing $8 a week, his entire life, while a combination of the two might be expected to equip him for a much larger position. And yet, specializing seems to be the order of the day, and so it was that, in 1905, I suggested that the gas industry should, in a more complete manner, specialize than it had in the past, and that there should be a recognized commercial side to the industry and a representative of that division in the form of a commercial gas association, as the other (the engineering) side was then represented by several associations largely technical in their composition. Yet, I would suggest that there is a possibility of too much of the element of specializing running in the veins of some people; for instance, the man who would study engineering, without studying commercialism, as I have said, will usually only get about so far and there he will stay. Let out engineering and our commercial gas associations keep in close touch.

The danger is less to be feared in the commercial field, for the same underlying fundamental principles which make a man a successful commercial man in, for instance, the machine field, will incline to make the same man successful in the lumber field, or in the gas field,

or in any other field, for the same general conditions, commercially speaking, exist in all fields. It is like whistling Yankee Doodle with variations. The theme is there; all you do is to ring a change upon it here and there. Thus the man who has educated and trained himself up to the point of being a successful commercial man can easily adapt himself to almost any commercial field; so it would seem to me that the men who have adopted commercialism in the gas field may, if successful there, look upon themselves as candidates for positions in any commercial field; whereas the man who gives himself up solely to a profession, as a rule must follow that specific profession, or else his earning power is gone.

Professions are necessary. However, for one, I am perfectly willing that another should be a doctor and that another should be a lawyer and another an engineer; but for me, give me commercialism. There is an enthusiasm about it that can hardly find a counterpart in any profession. The conduct of a business is like the playing of a great game of chess. Unfortunately, however, only too frequently men overstep the bounds, and in their endeavor to win the game forget the golden rule; and, whatever others may say, I am as firm in the belief to-day, as when I first had the motto given me, that the keynote of true and lasting success is "Do unto others as you would that others should do unto you." Unfortunately this motto has been cartooned, as it were, and by many is looked upon as one of the sayings of childhood. But I tell you that, in a vast number of cases, where concerns have eaten up others, like the seven fat kine eating up the seven lean kine in Pharaoh's dream, this could have been avoided if men had used their ingenuity to discover new fields, or new branches in old fields, in which to build up and develop their energies. Unfortunately men are inclined to be copyists. A man brings out a good lamp; another man copies it. A man brings out an improvement on a range; another man copies it. A man brings out an arc; another man copies it. And so it goes. Instead of each exercising the God-given gift of inventive genius and imagination, which if properly used would lessen the number of copyists, and would increase the number of devices created and perfected, and of fields entered and won. Personally I have sought to create, not to copy.

Commercialism is in every sense as high a type of occupation as ever was a profession. In fact, the commercial man who is honorable, straightforward, and in for the "square deal" only, I believe is in a sense a stronger type of man than a purely professional man who follows along a beaten trail; for I believe temptation to crookedness is greater in the field of commercial men than in the field of the engineer, or others who come in less frequent touch with the world of competition; and I believe that as a rule the commercial man is a keener one than the professional man, perforce of conditions. So to me commercialism (not that I love engineering less, but commercialism more) ranks with the foremost of occupations for which, whether in the realm of Association work or in everyday endeavor, my efforts will ever be for its true advancement.

I have not touched upon the details of methods in gas commercialism, as they who are here present, gas men and appliance men alike, being well informed upon these matters, will I hope advance suggestions and discuss them as a part of this topic given to me by your President.

(To be Continued.)

Bureau of Information, The American Gas Institute.

Under the direction of the Institute it has been decreed: 1. That the privilege of submitting questions be limited to members of the Institute. 2. Neither the Board of Directors of this Institute, nor the Institute as a body, make themselves in any way responsible for the statements of fact or expressions of view given out by the Bureau of Information.

BUREAU OF INFORMATION, THE AMERICAN GAS INSTITUTE,
HEADQUARTERS, 1943 COMMERCIAL NATIONAL BANK BUILDING.
W. A. BAEHR, Chairman. CHICAGO, ILLS., May 29, 1909.

Question No. 51 of the Bureau of Information was as follows:

Question No. 51.—"In the larger cities, how many district shops should be utilized in order to realize the most economical distribution costs? Assume the conditions as to the number of consumers per unit of area, also the size of the city and local characteristics as to growth, etc. The answer should also state the advisability of operating any of the other departments in connection with the distribution department at these district shops. Also, is it advisable to separate the costs of operation for each shop, at the same time cutting out a large number of special or detailed accounts, depending entirely on the comparison costs of the shops for a knowledge of the work done?"

ANSWER BY THE BUREAU OF INFORMATION.

The Bureau of Information has received an answer-at-large to this question which is satisfactory to it, and which it will accept as a proper answer. This answer-at-large is as follows:

ANSWER-AT-LARGE.

By Mr. Walton Forstall, Asst. Engineer of Distribution, Philadelphia Gas Works.—This question assumes that an answer may be given applicable to "larger cities," stating the exact number of district shops conducive to the most economical distribution work. The reality is that there will be a different solution for each city, for, in addition to the conditions "As to the number of consumers per unit of area, also the size of the city and local characteristics as to growth," etc., the layout of streets, the existence of water courses and railroad tracks and terminals, acting in the absence of bridges as barriers between adjoining localities, all these and many other conditions peculiarly local will determine the most economical distribution organization. Even in a concrete case—when the question for decision is shall a given territory be divided into two or more?—it is almost impossible to estimate exact operating costs under both sets of conditions. It is often equally difficult to compare actual workings before and after the division was made, for new factors come in to confuse the situation. Horse-sense will always have to play a certain part in matters of this kind. Therefore, all that can be attempted is a rather general survey of the points to be considered in deciding the division of distribution work into district shops.

It will be necessary, first, to define the function of the district shop. In some large cities each district shop corresponds to a separate distribution district, caring for main, service and meter work. Where this is true, the number of shops will be affected largely by the minimum amount of main work, for in actual operation the transfer of men from one district organization to another is not easily done. With less than 40,000 meters, and a main system not having more than an ordinary amount of winter leaks, the district main gang would not have enough work to do during the winter months on days when leaks were few, unless the district was a very growing one and the climate permitted building during the most of the year.

Let it be assumed, however, that the main and service work is independent of the district shop, which serves the consumer solely for inside work. The reasons against separate shops might be increased costs for salaries, rents and all other charges indispensable to separate establishments. The reasons for separate shops might be increased economy and prompter service, due to lessened distance between shop and consumer, being sufficient to offset any increased cost due to separate establishments. Where the geographical center of the community happens to be near the gas works, which has land not excessive in value, available for a distribution shop and yard, a condition might arise where 100,000 meters and over could be most economically served from one center. As factors in increasing the economic radius of a shop may be mentioned: (1), The telephone; (2), the bicycle, and (3), the motor wagon. (1), When the usual pay station call is but 5 cents, a system by which complaint men telephone in for orders several times a day, largely reduces the advantage of nearness possessed by the district shop. (2), The use of a bicycle instead of a wagon for all work where little or no material is carried, lessens the cost of each mile traversed. (3), The extensive replacement of horses by motor wagons, due within the next decade, tends toward one garage to replace scattered stables, and reduces the advantages of a district shop existing as a complete unit. Again, for much pipe cutting and threading, often done by hand, power can be profitably substituted if enough work can be provided. This is another argument in favor of concentration.

Separation of costs of operation is one of the advantages of district shops. When working from one shop, it is extremely difficult to ascertain results as between different inspectors or workmen. With more than one, shop, by a separation of payrolls and of material reports, each shop can be compared for each class of work cared for by a separate account. The increased economy obtained by such monthly comparisons may often overbalance increased fixed charges involved in separate establishments. Therefore, a failure to compare costs between shops involves throwing away one of the strongest advantages accruing from district shops.

Where a location, advantageous from the standpoint of distribution work, is also suitable for a new business store, and, therefore, for bill collection, there is every reason to combine the shop with the store, and this combination by reducing rents and making it easier for consumers to buy appliances and pay bills is an argument in favor of district shops.

In conclusion, it may be said that no change in existing conditions, either towards combining existing shops or establishing additional ones, should be effected without a careful consideration of all the *pros* and *cons*. In general, no subdivision is justified unless the number of consumers served is so large that, with a full utilization of all modern space-annihilating agencies, the costs after subdivision are less, or if more, nearly equal, and any slight excess is justified by prompter service and expectations of reduced cost owing to comparison possibilities.

Question No. 48.—"What are the comparative merits, in the case of large companies, of making meter repairs under a 'piece work schedule,' as compared with strictly 'day work?'"

ANSWER-AT-LARGE.

By Mr. Wm. A. Castor, Superintendent of Meters, United Gas Improvement Company, Philadelphia, Pa.—In the Philadelphia meter repair shop a modified form of the piece work system has been adopted. This system requires each man to perform a certain number of operations of a particular nature as a day's work, and for which he receives a stated wage. In addition to performing the above work, a certain amount of extra, or premium, work is allowed for each operation and for which a stated price is paid. Each man is required to accomplish the rated day's work, and is then allowed the full number of premium operations, or less, depending on his ability to do the work.

We are assured of obtaining a fairly constant output from the shop as a whole by this method, but at the same time the maximum amount of work is not obtained from each and every man working under this

premium system. The endeavor of every establishment is, or should be, to turn out the maximum amount of work per employee and per machine, and until this is accomplished the work cannot be turned out at the lowest cost, due to the fact that certain fixed charges, superintendence and inspection, do not increase with the increase in the output of finished work due to the introduction of the piece work system. The piece work system, to my mind, offers so many advantages to both employer and employee that there is nothing to be said in favor of straight, day work system.

The question has been raised as to the inferior quality of work turned out by the piece work system. The quality of work under any system depends entirely upon the thoroughness of the inspection to which the work of each man is subjected, and equally as good work can be turned out and as high a standard can be maintained under the piece work as under the day work system.

The proper rate to pay for each class of work, or for each operation performed under the piece work system, must necessarily be carefully determined. The quantity of work in every case, constituting a fair day's work for a man, can be and has been determined. With this as a base to work upon, the rate for each operation can be easily set so that the man who is only able to do the fair day's work will be enabled to earn a fair, living wage, while the more skillful fellow workman will be enabled to make the better wage, to which he is justly entitled.

It should be borne in mind that it is not practicable to place all men working in the meter repair shop on either a premium or a piece work basis, as certain work must necessarily come under the laboring and apprenticeship classes, and for which it would be difficult to fix any piece work prices.

A great deal more could be said at this time in favor of the piece work method of using employees, but I thing the following paragraphs, embodying the ideas and experiences of our foreman, Mr. B. G. Waggner, will convey the true story, as having been told by a man who has had experience in various meter repair and in new meter shops, with both systems of paying the employees. Mr. Waggner has carefully noted the conditions and has here plainly stated same as they have come under his observation:

"The advantages of the piece work system are, in my opinion, so great that the day work system is not worthy of consideration, where there is a large number of meters to handle in the meter repair shops.

"In the first place, piece work allows the shop to turn out the maximum number of meters, consistent with the quality of work desired, with the minimum amount of labor. The quality of work is very readily maintained with proper supervision."

In proportion to the volume of work turned out, the amount of supervision necessary is not as great as is required in the proper conducting of the day-work system in a large shop. This is accounted for by the fact that, with piece work, there are fewer men to look after, in comparison with the number of meters turned out, and that it keeps most of the men moving "in the right direction," while with the day work system the men soon learned to keep busy while doing very little work. And even when you impose a given task upon the men, they learn to make this task easy and to do the actual work in as little time as possible; the rest of the time is taken up in doing unnecessary work, such as extra wiping and polishing the meters. I have seen just as poor work done under day's work as under piece work.

The natural inclination of most every man is to be fast, and if possible a little faster, with his work, than the man next to him. This results in racing through their work and then filling in their remaining time in some useless manner. I have worked in quite a few shops conducted under both systems and in every day work shop one or two men were disliked and talked about by the rest of the men for rushing the work and taking chances on "killing the job," while in the piece work shop it is conceded by all to be a man's right to do as much work as will be allowed him. So that the *proper* supervision and inspection of the work are pretty near even under both systems. Another thing to consider in the possible slighting of work, is, under the piece work system you set the desired standard of work and you can maintain it by causing the men to know that that standard must be lived up to. This is easily done after one or two men have been discharged for slighting the work in the endeavor to turn out a large volume. On the other hand, with a day work system, the man who slights his work by rushing is likely to be tolerated because he serves as a "pace maker."

I have always found a greater feeling of content among the men of a piece work shop than among those if a day work shop, due, no doubt, to the fact that most of their time is taken up with their work and not with thinking of and talking about petty or fancied grievances.

Summing up the subject, I would say that piece work was the better system of the two, for the reason that just as good a quality of work can be maintained under it as under day work and at a greatly reduced cost per meter, and that greater justice is done the men, for the reason it allows every man to earn wages according to his ability, and also for the reason that the men are better satisfied and therefore more easily managed. The shop force, under a piece work system, will eventually consist of the best workmen obtainable, as the good man invariably hunts the shop where he can make the most money, and the slow, indifferent or incapable workmen are soon detected and weeded out.

In conclusion I would say that I have seen several large shops go from the day work to the piece work system, but I have never seen one change from a piece work basis back to a day work basis."

Items of Interest
FROM VARIOUS LOCALITIES.

Mr. John J. Power, for many years the faithful and successful Superintendent of the Cumberland (Md.) Gas Light Company, has resigned that position in order to accept a place on the engineering staff of the Washington Gas Light Company. He will continue to act as Consulting Engineer to the Cumberland Company.

Mr. J. B. Brady, writing under date of the 29th ult., incloses the following: "The plaintiff, in an action against a water company, was the owner of a handsome residence situated in the city of Jackson, Miss., and had installed in a bathroom a specimen of an instantaneous gas water heater. This heater was so arranged that it was comparatively safe as long as there was a continuous flow of water, but became highly dangerous if left burning after the water supply had ceased. On a certain afternoon the plaintiff lighted the gas and turned on the water and then left the bathroom for a few minutes. During her absence the flow of water ceased, and as a result the house was set on fire and subsequent substantial damages resulted. The cessation in the flow of water was due to the fact that the Water Company, in order to repair a leaking hydrant, had cut off the water along the street in front of applicant's residence, and no notice of its intention to make the repairs had at any time been given the householders. The flow of water was suspended for about one-half hour. It was shown on the hearing that the Water Company had no notice of the fact that the heater had been installed in plaintiff's residence. It was held that the Water Company was not liable. To allow the plaintiff to recover in such a case would be 'to say that it was the duty of the Water Company to keep abreast with the march of modern progress, and that it must be charged with knowledge of the fact that these heaters had come into general use; that knowing that many citizens had installed these devices, it was the duty of the Water Company to search out these persons and notify them of the intention to shut off the water, or that some system of signaling, or other manner of giving notice should have been adopted.' This the Court concluded, would impose too high a degree of vigilance upon the Company." Terame v. Light, Heat and Water Company, Supreme Court of Mississippi; 48 So. Rep., 728.

Mr. A. B. Borden, writing from Little Rock, Ark., some days ago, incloses the following: "Some days ago Mr. M. A. Lally, who was recently appointed to test the meters of the gas consumers, reports that on the first 'try' he is amazed to find that the majority of the meters submitted to the testing prescribed have been found to register slow. On his first official counting up it was shown that 30 meters had been tried, of which 6 were found to register (average) 3.10 per cent. fast; 12 were found to register (average) 6.30 per cent. slow; the balance were within the 2 per cent. variation allowed under the law."

The Saranac (N. Y.) Lighting Company has been authorized by the Public Service Commission for the District to contract with Charles G. Starr, of Philadelphia, to build and construct a gas plant at Saranac Lake, under this financial arrangement: The plant is to cost complete $84,000, to be paid as follows: $59,000 in first mortgage bonds of the Company, of an authorized issue of $100,000, the Gas Company agreeing that not any of its bonds have as yet been issued, and $25,000 of full paid capital stock of the Company of the total authorized issue of $50,000.

Mr. J. P. Ray tendered his resignation as Manager of the Albion (Mich.) Gas Company, the same to date from June 1st.

"D. R. S.," sends the following from Chicago under date of May 31st: "Several hundred employees of the Peoples Gas Light and Coke Company were entertained at the rooms of the Central Young Men's Christian Association, by Mr. Norman Macbeth, who delivered an illuminating lecture on 'How to make gas yield more light with the use of improved upright and inverted burners.' The lecturer contrasted the ordinary method of lighting with those employed by

experts, and told how modern illumination could be greatly improved with the exercise of a little care. The lecturer included gas illumination in theory and practice, and also gas lighting as contrasted with electricity. Mr. E. G. Cowdery, President of the Peoples Company, introduced the lecturer, who told the employees that the purpose of the lecture was to educate them in matters of gas illumination which especially pertained to the consumers' end. This lecture was the first of the sort ever attempted by the Company, but its success assures the taking on of the plan on quite an extended scale."

THE artificial lighting suppliers of Baltimore, Md., have some reason for congratulation over the outcome of the contention between them and the local authorities in respect of tax easements. The settlement, the main features of which are given out in the appended statement by City Solicitor Poe, is really not thoroughly or completely fair to the Companies, but, such as it is, it affords some relief from claims and conditions that were serious to a degree. Solicitor Poe's statement is as follows: "The City and the Consolidated Gas, Electric Light and Power Company, through Mr. S. Davies Warfield, Chairman of the Board, have reached a final settlement of all matters in dispute between the city and that Company, growing out of the effort made by the city in the last 4 years to assess for purposes of taxation. The negotiations have been pending for some months, and the figures which have been finally agreed upon are practically those which were submitted by the city to the Company for consideration about 4 months ago, shortly after the city had reached a settlement with the Chesapeake and Potomac Telephone Company as to the taxation of that Company's easements. Under the terms of the settlement the easement of the Consolidated Gas, Electric Light and Power Company, of Baltimore, for 1908 and 1909, is fixed at $4,650,000 for each year, and for 1910 at $4,900,000. The easement of the Baltimore Electric Company, now leased to the Consolidated Company, is fixed for 1908, 1909 and 1910 at $100,000 for each year. For 1905 the United Electric Light and Power Company, which has since been absorbed by the Consolidated Gas, Electric Light and Power Company, pays on an additional assessment of $600,000, and for 1906 the Consolidated Gas, Electric Light and Power Company, which has since been absorbed by the Consolidated Gas, Electric Light and Power Company, of Baltimore, pays an additional assessment of $810,000, and for the year 1907 the Consolidated Gas, Electric Light and Power Company, of Baltimore, pays, in addition to its gas easement of $3,250,000, or an assessment of $900,000. The agreement also provides for valuing any easement to be acquired in the future by said Company, at certain fixed rates per mile. From $12,000,000 to $15,000,000 are to be expended in bringing natural gas into the city. The result is that the plans already mapped out will provide for the immediate commencement of this work in order that natural gas may reach the city the coming winter. This means that within 30 days some 5,000 or 6,000 men will be employed in carrying out the proposed work."

A CORRESPONDENT in Kalamazoo, Mich., writing under date of May 26th, says that the first sound in the action for a receiver for the Dowagiac (Mich.) Gas Company, to make plain an indedtedness amounting to $40,000, alleged to be due to the Dowagiac City (failed) Bank, has been taken. On the 22d of May suit was brought, and a ruling given in which the Cass County Circuit Court overruled a demurrer interposed by the Company against Trustee Klienmark's motion. The Company was given 15 days to make a showing of cause. The Dowagiac Company is controlled by Mr. Russell Harrison, son of the late ex-President Harrison.

MR. SYLVESTER WATTS, owner of the Columbia (Mo.) gas works, promised last fall that he would visit New York this spring. He didn't keep his word; although he "almost did." That is, he got as far east as Washington, D. C. Deacon Hart and Choirmaster Fisher rarely let anything get by them; so the Watts' proposed visit terminated "in Washington." It is likely that the Columbia plant will be greatly enlarged this summer.

MR. W. E. BARRET, Engineer-in-Chief of the go-ahead gas concern known in this section by the distinctive title of J. G. White & Co., is busily engaged in extending the main system of the Company's gas plant in Davenport, Ia. The output increase in Davenport continues to be all to the good.

MR. B. F. HARDING, the long-serving, painstaking and up-to-date Superintendent of the Bridgeton (N. J.) Gas Light Company, writing under date of the 1st inst., has this to say:

To the Editors, AMERICAN GAS LIGHT JOURNAL: I see in your last issue of the AMERICAN GAS LIGHT JOURNAL that you are shortly to celebrate your Fiftieth Anniversary. At first sight of your article respecting it I was particularly interested, in consequence of its being so near the like anniversary of our own works. Knowing the JOURNAL has been coming into our own office since the commencement of my management here, 36 years ago, I felt inclined to see how much longer it had been coming. Referring to our own books I find that it has been taken the entire 50 years. I have found it in all these years to be interesting and profitable. Our office equipment would not be complete without it. I trust it may be continued for many years.

WALTON S. BOWERS, acting for the Trustees of the Sinking Fund of Hamilton, O., asks for the submission of proposals for a bond issue amounting to $90,000, to take up existing bonds and to provide funds for constructing the municipal gas works. The bonds are to bear 4 per cent. per annum, are to run for 25 years, and the bids were to be opened the 1st inst.

"W. B. S.," writing from Racine, Wis., under date of the 29th ult., incloses this mention: "Upon condition that the authorities grant the right to the Manitowoc (Wis.) Gas Company to establish a minimum of readiness-to-serve charge of 50 cents per month, it has submitted a proposition to the Committee on Light and Gas of the City Council which, if accepted, will put the rate of gas, for both fuel and lighting use, at the uniform rate of $1.05 per 1.000, for a period of two years from June 1st. After June 1st, 1911, the Company agrees to grant a rate of $1 per 1,000 for all gas supplied the city, the minimum charge to be permanent. The Committee is giving close study to the proposition, and, if one may judge from stray words spoken outside the hall of considering, the scheme looks to have more than a chance for enactment. The ruling gas prices are: For illuminating, $1.50 per 1,000; for fuel, $1.25—less 25 per cent. on each schedule when accounts are settled on or before the 10th of the month. The chief aim of the Company in the current proposition is to abolish the 2-meter system, which would be possible with a fixed similar charge for both kinds of uses. The minimum charge would guarantee the Company a stipulated revenue for its service, which, if accepted, would cause the virtual abolition of the service charge which the Company demands in its appeal to the Railroad Commission. If the proposition is accepted the litigation now pending in the Supreme Court will be dropped and the new schedule of rates will go into effect at once, the $1.05 rate to continue to June, 1911, at which time the $1 rate would be granted to consumers."

INCLUDED in the plans for the proposed extensions to the works of the Ypsilanti (Mich) Gas Company is the placing of a new station meter. In the generating division the Laclede-Christy Clay Products Company will erect 3 benches of half-depth 6's, complete, and from the latest designs of the contractors.

WRITE to the C. W. Hunt Company, West New Brighton, N. Y., for a copy of its "Catalogue No. 091, Engineers' Edition." Many, in fact most, of its listings, are of actual practical interest to gas men. Its get-up, from a printer's point of view, is unexceptionable.

"V. A. L.," writing from Laramie, Wyo., May 26th, asks: "Dear JOURNAL—What do you hear about John D. Losekamp and friends' project to commence the construction of a plant at Billings, Mont.? Wasn't work thereon to have been commenced by May 1st? Has it been commenced?" Haven't heard anything about it lately. Had no reason to believe that Losekamp and his associates did not mean what they said. In fact, we are not sure that work has not been begun. Just give them a chance.

MR. HORACE BEESON, as Editor of the Suburban Gas Company's publication, particularly of the Company's monthy known to fame as "Gasps" is responsible for this way of getting around dame nature. Flaherty was the speaker, Murtha was his audience; between them was this dialogue: Flaherty, "I have a barrel that weighs 10 pounds; I want a lighter one. How will I manage it?" Martha, "Sure, you're no commercial engineer! Fill it full of holes."

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHARLES H. WADELTON,
MANAGER.

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MONDAY, JUNE 7, 1909.

The Market for Gas Securities.

There is only ¼ point difference between the prices recorded at noon to-day (Friday) for Consolidated gas as compared with those of last week—144¼ to 144½. The market as a whole is extremely dull, but professionals incline to the view that we are close to a bull movement, the proportions of which will likely surprise even those who helped start it.

Brooklyn Union is steady, and holders are commencing to speculate as to what the rate of the next return on their shares is to be. The Company's position improves from day to day. Peoples, of Chicago, now on a 7 per cent. basis, looks very tempting at the offering price of 115. Massachusetts Gas Companies is 65 to 65½ for the common; the preferred is 90½ to 91.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

JUNE 7.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies,	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated Gas Co.	$73,177,000	100	144¼	144⅜
Central Union Gas Co.—				
1st 5's, due 1978, J. & J.	3,000,000	1,000	98	101
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	100	101
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	137	140
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91½	92
Yonkers	200,650	500	130	—
Out-of Town Companies.				
Bay State	50,000,000	50	1¼	1½
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	90	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	60	60½
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	105½
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,662,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,600,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	103	103½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis	10,000,000	100	—	100
Preferred	2,500,000	100	60	90
Bonds	10,000,000	1,000	104	104¼
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108½
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	65	65¼
Preferred	25,000,000	100	90½	91
Montreal Gas Co., Canada	2,000,000	100	218	218½
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	114½	115
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	116	—
Consolidated 5's	2,000,000	—	104¾	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	100	102
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	600,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	2,600,000	20	343¾	347½
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	220	—

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(Continued on page 1030.)

Position Wanted

As Superintendent,

By a competent gas man who has had practical experience in all branches of the business, both coal and water gas. At present employed. A-1 references.

1755-tf Address, "R. C.," care this Journal.

Tenders for Repairs to Concrete Gasholder Tank.

Sealed tenders addressed to H. B. R. Craig, City Engineer, and marked "TENDERS for GASHOLDER," will be received up to 12 o'clock, noon, the 19th day of June next, for the repair of the concrete gasholder tank belonging to the Corporation of the City of Kingston, Canada. Information and general specifications may be obtained upon application to the undersigned. The lowest or any tender not necessarily accepted.

1773-2 (Signed) H. B. R. CRAIG, City Engineer.

Position Wanted.

On or before May 1st I shall be open for a position as superintendent or manager of a gas or electric property or of a combined property. I am a graduate of a leading technical university and have had 6 years of actual operation in the above lines. I am obliged to look for a position because of a complete change in the management of the companies I am now employed with as assistant to the president. I can refer directly to him as one of my references, and also to several leading gas and electrical engineers as to my ability and character. I am 29 years of age. Address reply to "M.,"

1766-tf Care this Journal.

Position Wanted.

Position wanted by a married man, 30 years of age, who has had 10 years' practical experience in the manufacture, distribution and construction of coal and water gas, high and low pressure. Is a draughtsman, can handle transit and leveling instruments, has some experience in the electric and water business. Party is now engaged as superintendent of gas department, but prior to panic was acting as gas engineer for a well-known engineering concern and prefers such a position, or one with a corporation who are in possession of gas properties that are lacking of satisfactory results.

Address, "DEEKER,"

1772-3 Care this Journal.

WANTED,

Gas Manager for Small Town in Middle West.

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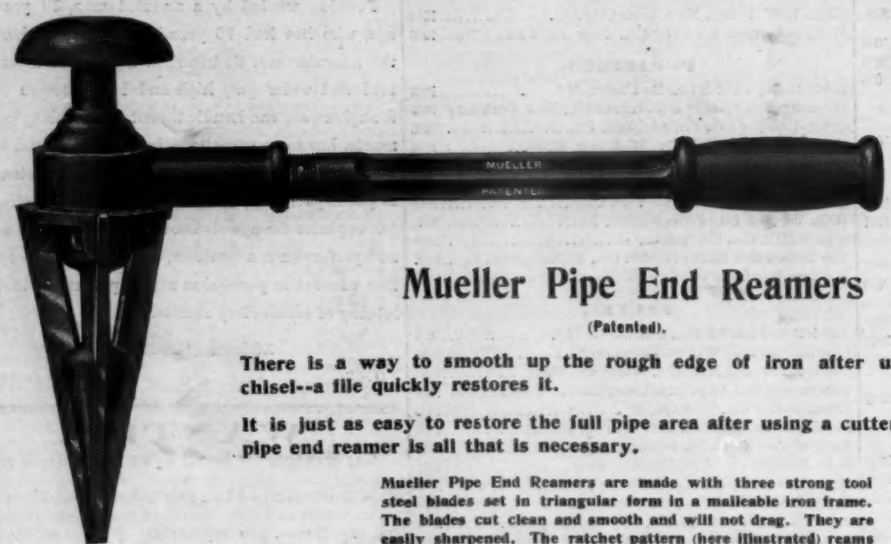

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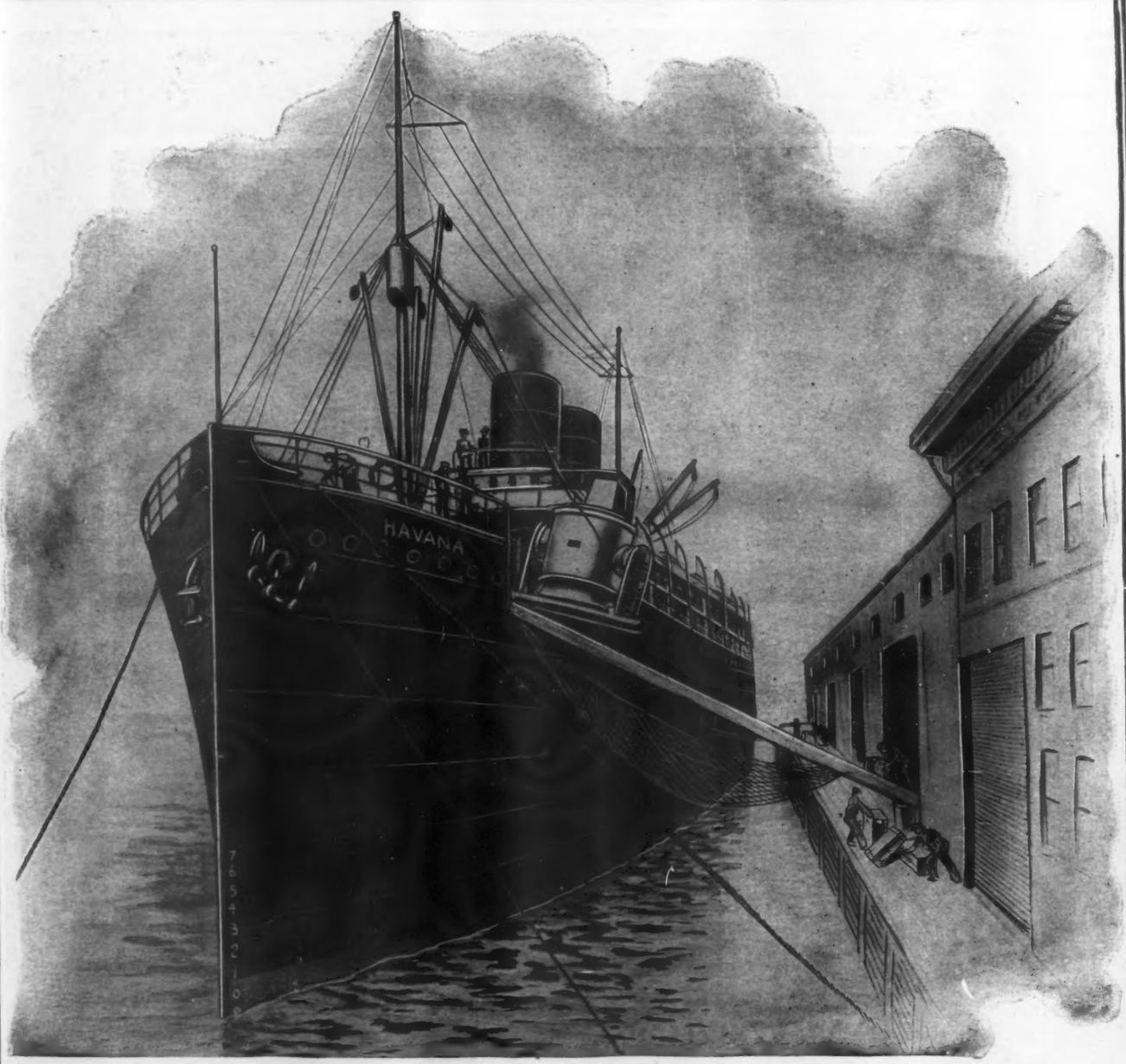

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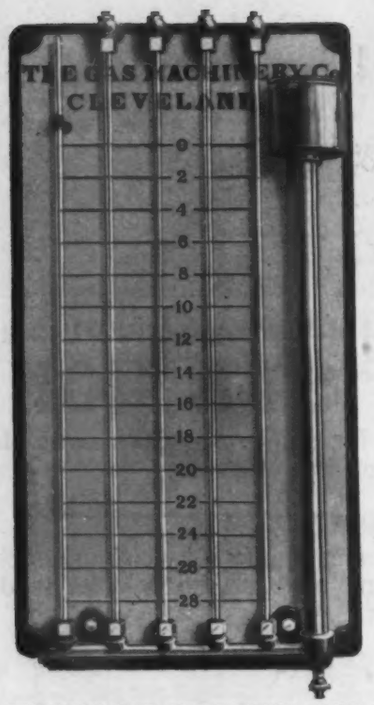

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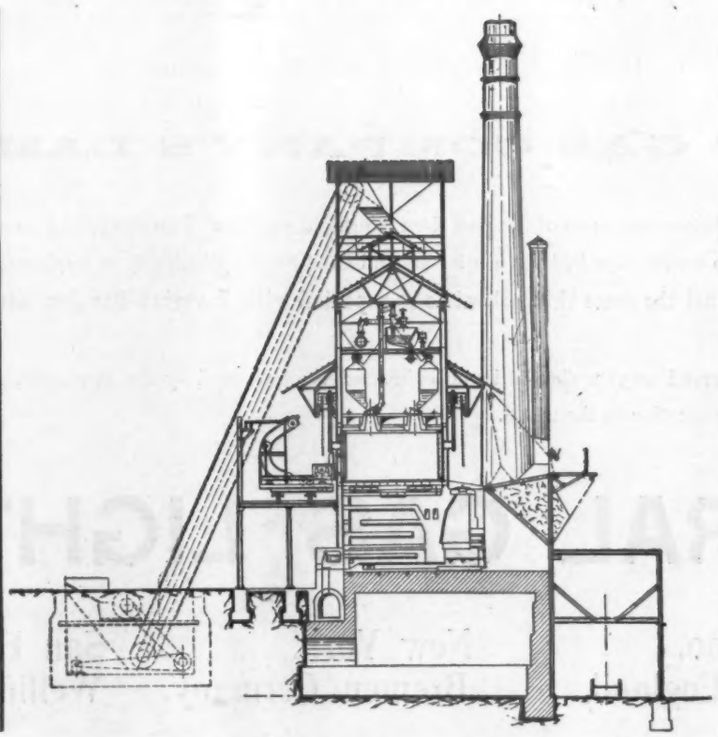

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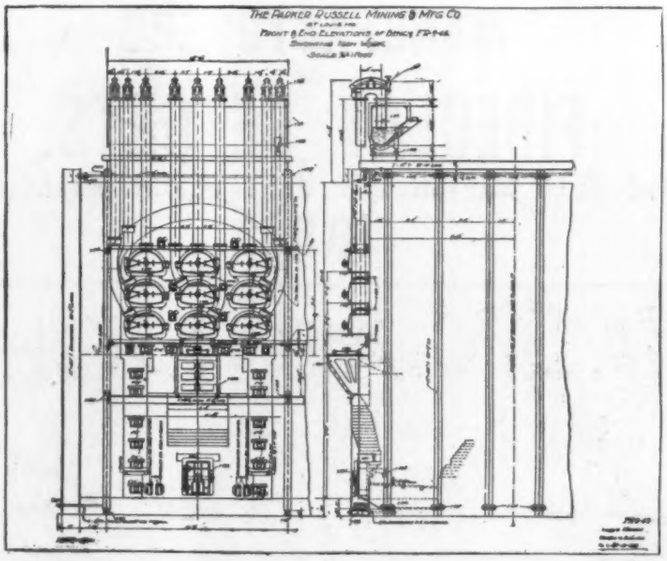

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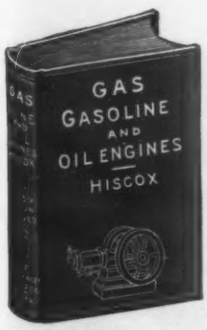

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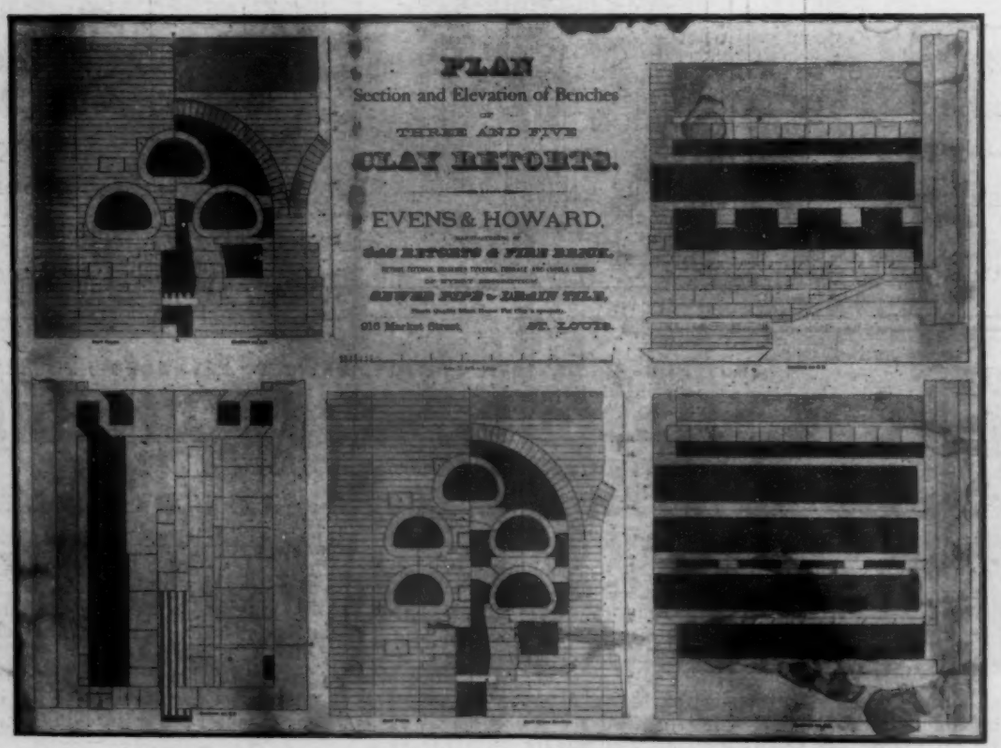

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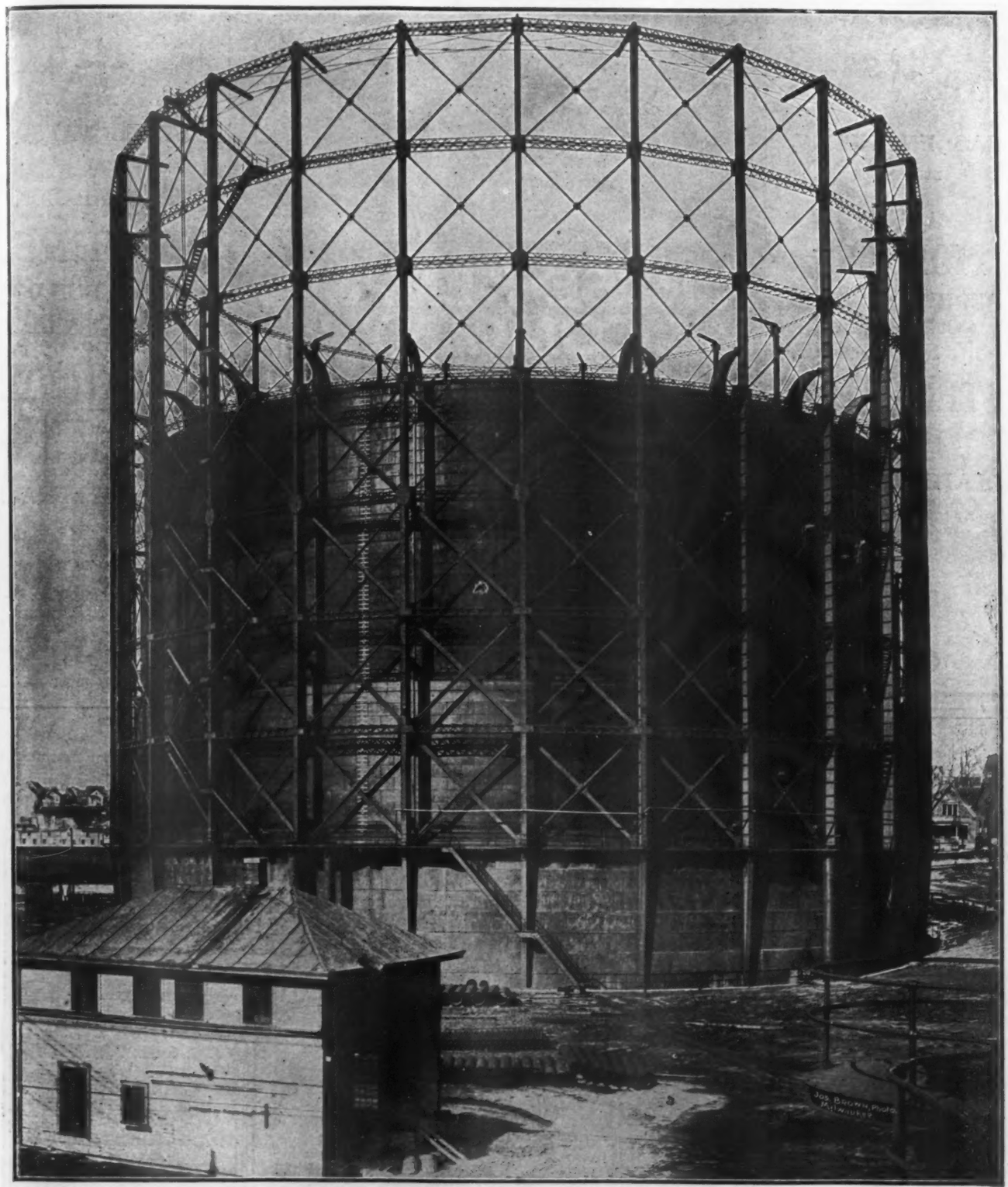

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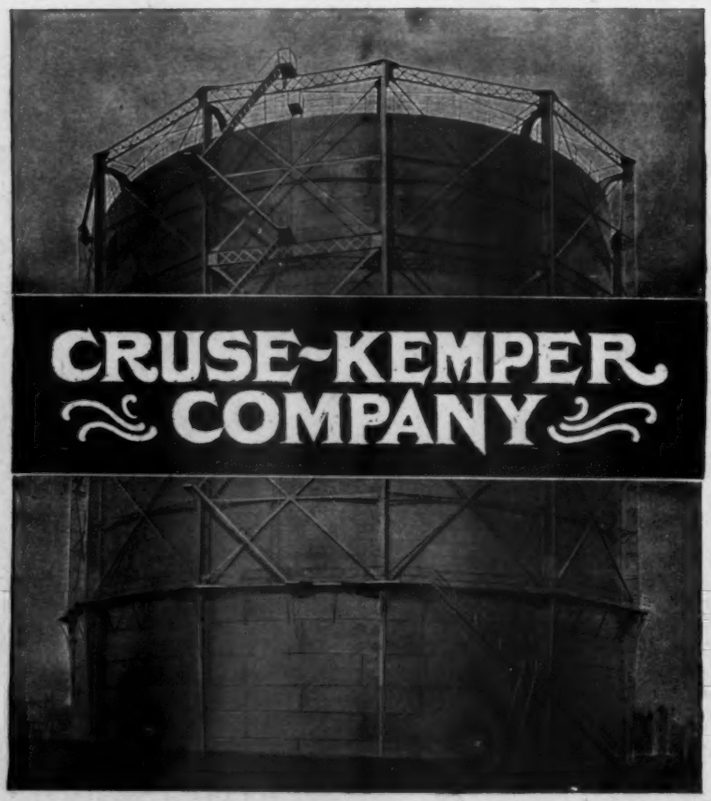

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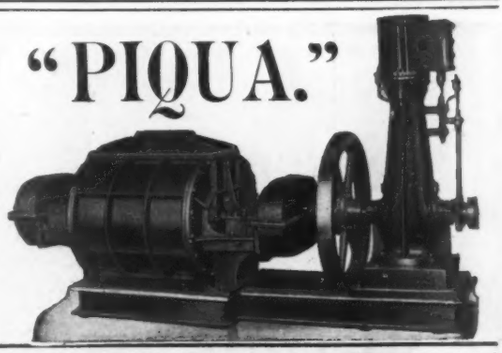

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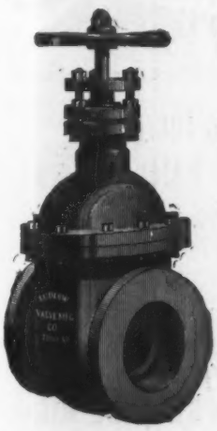

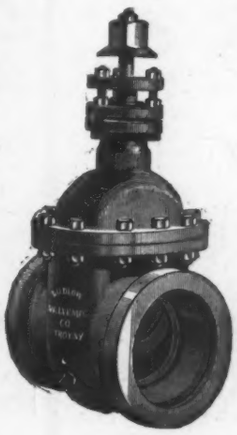

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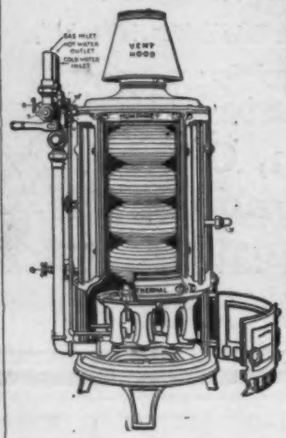

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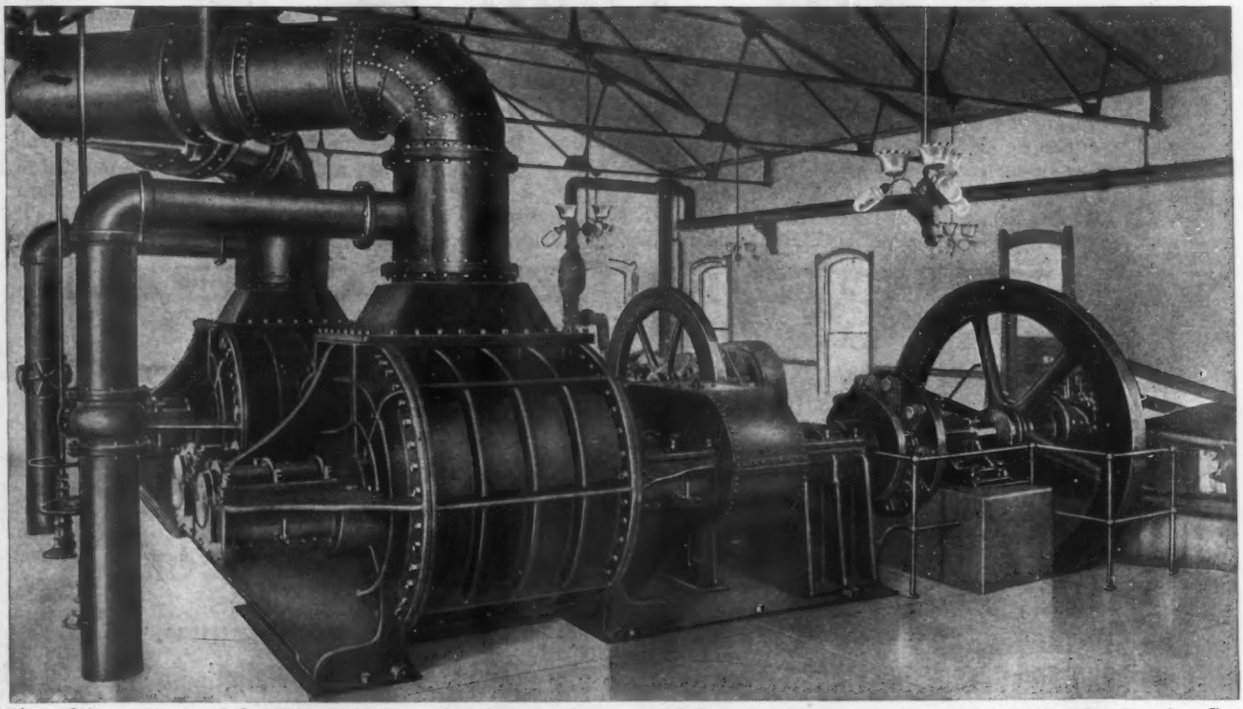

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Recommended by the Public Service Commission.

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"**Metal Tips should never be placed on burners, as they waste gas.** The conclusion is reached from a study of all the various factors which enter into the ideal burner and after an examination of the comparative merits that the BRAY UNION JET IS SUPERIOR FOR GENERAL USES."

"THE CONSOLIDATED GAS CO., OF NEW YORK, **Gave 329,397 Bray Burners to their consumers in 1908.**"

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DONALDSON IRON COMPANY. EMAUS, PA.

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CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

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STANDARD REDUCTION FACTORS FOR GASES,

A Number of Tables Necessary for the Reduction of the Volume of any Gas at any Temperature, Pressure and Degree of Saturation to its Equivalent Volume under Standard Conditions,

TOGETHER WITH

A Table for the Numerical Solution of Certain Exponential Equations,

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AMERICAN GAS LIGHT JOURNAL, 42 Pine Street, New York City.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

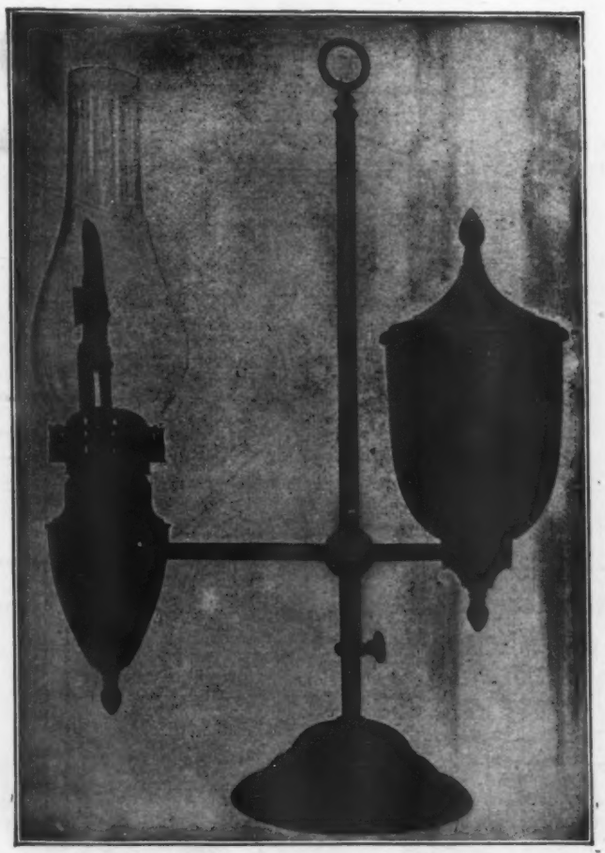
JUNE, 1909.

Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.
Tue.	1	2.40AM	3.30AM
Wed.	2	No L.	No L.
Thu.	3	No L.FM	No L.
Fri.	4	No L.	No L.
Sat.	5	7.50PM	10.20PM
Sun.	6	8 00	11.10
Mon.	7	8.00	12.00
Tue.	8	8.00	12.40AM
Wed.	9	8.00	1.20
Thu.	10	8.00LQ	1.50
Fri.	11	8.00	2.20
Sat.	12	8.00	2.40
Sun.	13	8.00	3.10
Mon.	14	8.00	3.30
Tue.	15	8.00	3.30
Wed.	16	8.00	3.30
Thu.	17	8.00NM	3.30
Fri.	18	8.00	3.30
Sat.	19	8.00	3.30
Sun.	20	8.00	3.30
Mon.	21	8.00	3.30
Tue.	22	10.10	3.30
Wed.	23	10.40	3.30
Thu.	24	11.10	3.30
Fri.	25	11.30FQ	3.30
Sat.	26	11.50	3.30
Sun.	27	12.10AM	3.30
Mon.	28	12.40	3.30
Tue.	29	1.10	3.30
Wed.	30	1.50	3.30

TOTAL HOURS DURING 1909.

By Table No. 1.

	Hrs.Min.
January	212.20
February	183.40
March	173.00
April	151.10
May	144.10
June	138.50
July	145.40
August	160.30
September	180.00
October	201.00
November	216.30
December	233.40
Total, yr.	2140.30



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✻✻✻

10-Candle Power.

✻✻✻

This lamp is a perfect substitute for the 10-candle Pentane Lamp hitherto used, and has the following advantages:

1st. It uses Standard Kerosene Oil (Pratt's Astral Oil or equivalent).

2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.

3d. It is much less dangerous than Pentane, which is a kind of gasolene.

4th. It is not easily affected by air currents in the photometer room.

5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.

6th. The first cost of the lamp brings it within the reach of even small gas works.

7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.

8th. Is not affected by the weather.

PUBLIC LIGHTING TABLE.

JUNE, 1909.

Day of Week.	Date.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Complete Lighting in One Hour	Complete Extinguishing in 50 Minutes
		From Time Given	
		P. M.	A. M.
Tue.	1	7.12	3.17
Wed.	2	7.12	3.17
Thu.	3	7.12	3.17
Fri.	4	7.17	3.12
Sat.	5	7.17	3.12
Sun.	6	7.17	3.12
Mon.	7	7.17	3.12
Tue.	8	7.17	3.12
Wed.	9	7.17	3.12
Thu.	10	7.17	3.12
Fri.	11	7.17	3.07
Sat.	12	7.17	3.07
Sun.	13	7.17	3.07
Mon.	14	7.17	3.07
Tue.	15	7.17	3.07
Wed.	16	7.17	3.07
Thu.	17	7.17	3.07
Fri.	18	7.22	3.07
Sat.	19	7.22	3.07
Sun.	20	7.22	3.07
Mon.	21	7.22	3.07
Tue.	22	7.22	3.07
Wed.	23	7.22	3.07
Thu.	24	7.22	3 07
Fri.	25	7.27	3.07
Sat.	26	7.27	3.07
Sun.	27	7.27	3.07
Mon.	28	7.27	3.07
Tue.	29	7.27	3.07
Wed.	30	7.27	3.07

TOTAL HOURS DURING 1909.

	Hrs.Min.
January	428.30
February	358.15
March	353.10
April	298.10
May	263.20
June	234.45
July	248.30
August	278.00
September	311.25
October	370.05
November	397.40
December	438.35
	3980.25
Deduct on account of 50 min. extinguishing time	30.25
Total, yr.	3950.00

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 512 Oak Street.

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No. 36.

....OF AMERICA....

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Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

Welsbach Junior

THE BIGGEST LITTLE LIGHT IN THE WORLD.

The Welsbach Junior Light is 5 inches high--consists of burner, mantle and chimney--and is attractively boxed in a pasteboard carton.

As its effectiveness and economy become better known the Welsbach Junior will supersede, for universal use in the home, the old-style open flame gas burners.

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Uses Two Feet of Gas per Hour.

Attaches to Any Gas Fixture.

Completely Hidden from View.

Use your own globe--either gas or electric.

Showing Welsbach Junior Light used in connection with ordinary glass globe.

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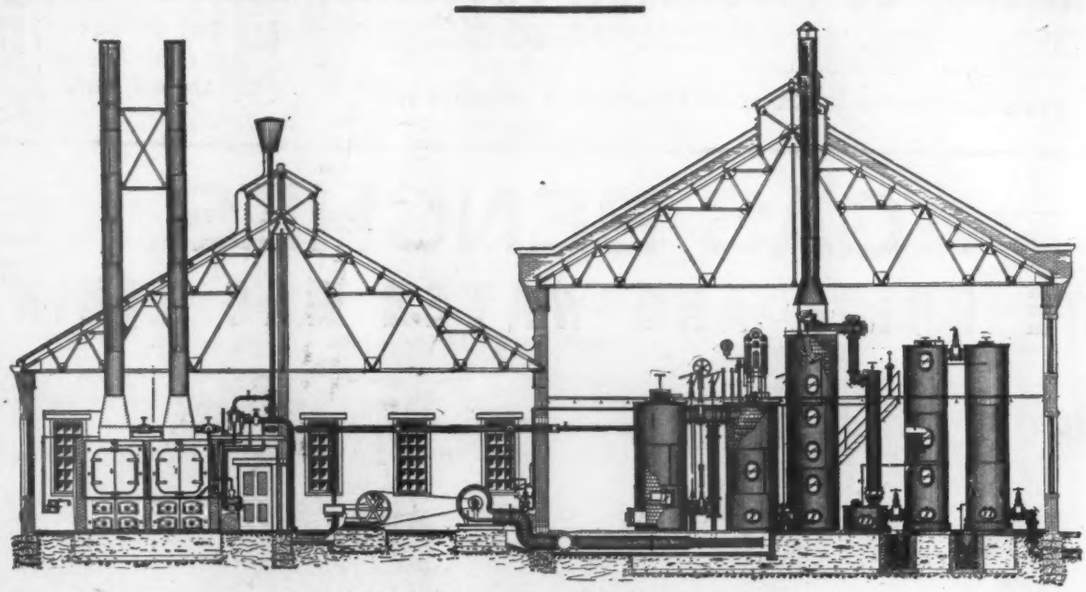

TOTAL SETS INSTALLED TO DECEMBER 31, 1908, ... 690
TOTAL DAILY CAPACITY, TO DECEMBER 31, 1908, ... 558,565,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts.
Straight Standpipe Cleaners.
Waste Heat Boiler.
Hygrometer.
Meters for Regulating Air and Steam Supply to Water Gas Apparatus.

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GEROULD'S IMPROVED RETORT CEMENT.

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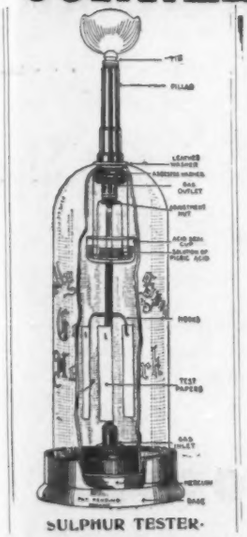

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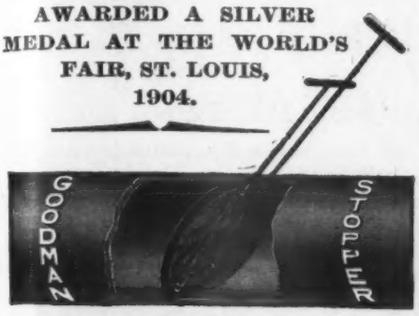

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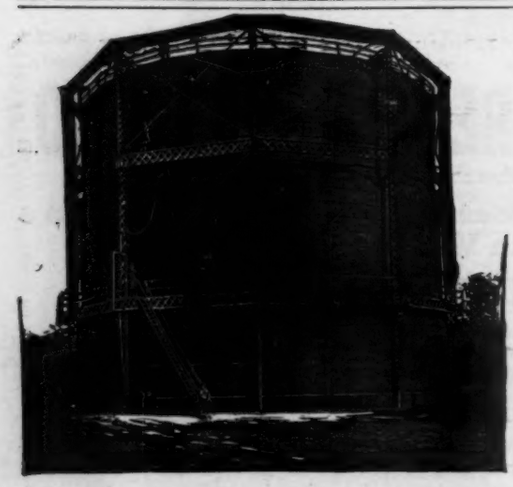

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Percentage of moisture does not exceed 6.6 per cent.

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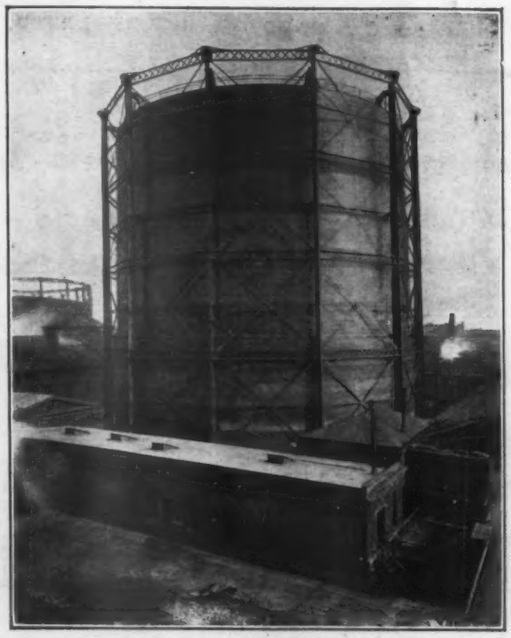

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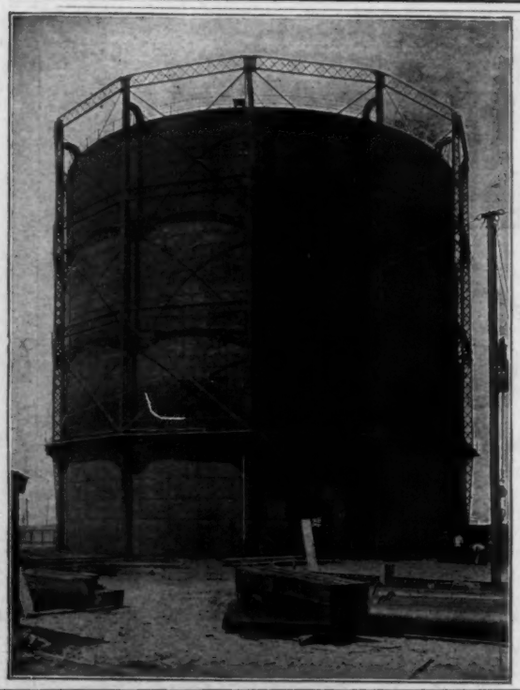

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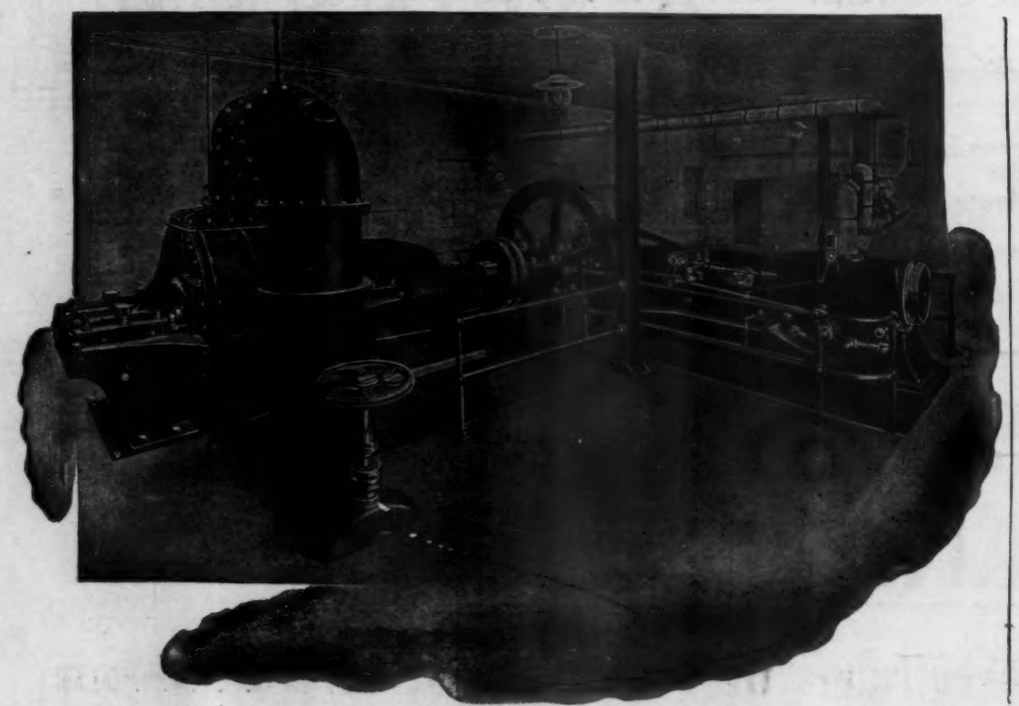

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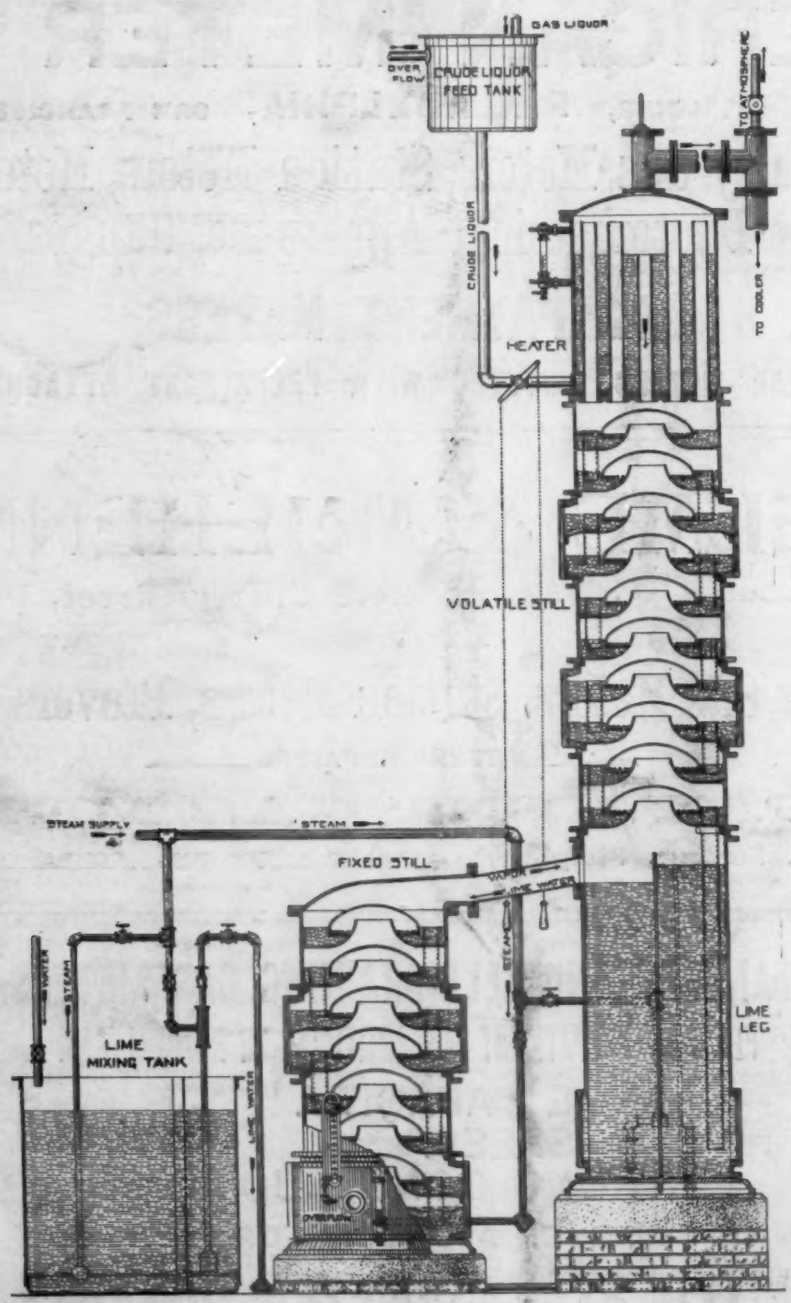

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